

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

CARNEGIE INSTITUTION OF WASHINGTON,
M7D CORPORATION,

Plaintiffs,

v.

PURE GROWN DIAMONDS, INC. and
IIA TECHNOLOGIES PTE. LTD d/b/a
IIA TECHNOLOGIES,

Defendants.

PURE GROWN DIAMONDS, INC.,

Counterclaim-Plaintiff,

v.

CARNEGIE INSTITUTION OF WASHINGTON,
M7D CORPORATION,

Counterclaim-Defendants.

Civil Action No. 1:20-cv-00189-JSR

**PLAINTIFFS' RESPONSE TO
LOCAL CIVIL RULE 56.1 STATEMENT OF MATERIAL FACTS
IN SUPPORT OF DEFENDANTS PURE GROWN DIAMONDS, INC. AND
IIA TECHNOLOGIES PTE. LTD.'S MOTION FOR SUMMARY JUDGMENT**

Defendants Pure Grown Diamonds, Inc. (“PGD”) and IIa Technologies Pte. Ltd. d/b/a IIa Technologies (“2A”) (collectively with PGD, “IIa”) moved for summary judgment on October 13, 2020 (ECF No. 93) and filed, among other things, a Local Civil Rule 56.1 Statement of Material Facts in support of the Motion for Summary Judgment (ECF No. 96). Plaintiffs Carnegie Institution of Washington (“Carnegie”) and M7D Corporation (“M7D”) (collectively, “Plaintiffs”) respectfully submit the following responses to IIa’s purportedly established material facts.

I. THE '078 PATENT

1. U.S. Patent No. 6,858,078 (“the '078 patent”) issued on February 22, 2005, and claims priority to Provisional Application No. 60/331,073, filed on November 7, 2001. Ex. 1.¹ It is titled “Apparatus and Method for Diamond Production,” and names Drs. Russell J. Hemley, Ho-kwang Mao, Chih-shiue Yan, and Yogesh Vohra as inventors.

RESPONSE: Undisputed.

2. Plaintiffs assert that Defendants infringe claims 1, 6, 11, 12, 16, and 20 of the '078 Patent. Ex. 2.

RESPONSE: Undisputed.

3. The asserted claims of the '078 patent recite:

1. A method for diamond production, comprising:

controlling temperature of a growth surface of the diamond such that all temperature gradients across the growth surface are less than 20° C.; and

growing single-crystal diamond by microwave plasma chemical vapor deposition on the growth surface at a growth temperature in a deposition chamber having an atmosphere with a pressure of at least 130 torr.

6. The method of claim 1, wherein the pressure is 130-400 torr.

¹ Citations to Exhibits 1 through 57 refers to the exhibits attached to the Declaration of J. Preston Long in Support of Defendants’ Omnibus Motion for Summary Judgement, filed on October 13, 2020. ECF No. 97.

11. The method of claim 1, wherein a growth rate of the single-crystal diamond is 1 to 150 micrometer per hour.

12. A method for diamond production, comprising:

controlling temperature of a growth surface of the diamond such that all temperature gradients across the growth surface are less than 20° C.; and

growing single-crystal diamond by microwave plasma chemical vapor deposition on the growth surface at a temperature of 900–1400° C.

16. The method of claim 12, wherein a pressure of an atmosphere in which diamond growth occurs is 130-400 torr.

20. The method of claim 12, wherein a growth rate of the single-crystal diamond is 1 to 150 micrometer per hour.

Ex. 1 at 14:64–15:63.

RESPONSE: Undisputed.

4. Plaintiffs no longer assert claim 15 against Defendants. Ex. 2 at 3. Claim 15 depends on claim 12 and recites:

15. The method of claim 12, wherein the atmosphere further includes 1-3% oxygen per unit of hydrogen.

Ex. 1 at 15:44-45.

RESPONSE: Undisputed.

5. When providing a Background of the Invention, the '078 Patent acknowledges that growing diamond by MPCVD at lower temperatures and pressures was known, providing various examples of such processes and criticizing them. *Id.* at 1:15-59.

RESPONSE: Plaintiffs object to this proposed fact as vague, in particular as to the phrases “lower temperatures and pressures” and “criticizing.” Undisputed that the '078 patent discusses an example of CVD synthesis at temperatures of 800-1200 °C and an example of MPCVD synthesis at pressures of 1-8 kPa and temperatures of 800-1000 °C, and that these processes had growth rates of no more than three

micrometers per hour. Ex. 1, '078 patent 1:30-51. Otherwise, disputed as not supported by the cited evidence.

6. The '078 Patent identifies a problem with respect to single-crystal diamond growth, stating that “[t]ypically, attempts to produce single-crystal diamond at growth rates higher than about one micrometer per hour result in heavily twinned single crystal diamonds, polycrystalline diamond, or no diamond at all.” *Id.* at 1:56-59.

RESPONSE: Plaintiffs object to this proposed fact as vague, in particular as to the term “problem.” Undisputed that IIa has accurately quoted a portion of the '078 patent but disputed that the patent characterizes this as a “problem.”

7. The '078 Patent then states that “Precise control over growth surface temperatures and growth surface temperature gradients prevents the formation of polycrystalline diamond or twins such that a large single crystal diamond can be grown.” *Id.* at 6:48-54; *see also id.* at 4:51- 55, 5:1-10, 13:25-27, 13:66-14:1.

RESPONSE: Plaintiffs object to this proposed fact as vague, in particular as to the term “then,” as no predicate is provided. Undisputed that IIa has accurately quoted a portion of the '078 patent.

8. The '078 Patent describes each of Figures 1, 3, and 5 as “a diagram of a diamond production apparatus according to [an] embodiment of the present invention in which a cross- section of deposition apparatus with a specimen holder assembly . . . is depicted.” *Id.* at 3:26-30, 3:31-40, 3:44-48.

RESPONSE: Disputed that IIa has accurately quoted the '078 Patent with respect to each of the three noted Figures. The '078 patent states:

FIG. 1 is a diagram of a diamond production apparatus according to an embodiment of the present invention in which a cross-section of deposition apparatus with a specimen holder assembly for holding the diamond stationary during a diamond growth process is depicted.

FIG. 3 is a diagram of a diamond production apparatus according to an

embodiment of the present invention in which a cross-section of a deposition apparatus with a specimen holder assembly for moving the diamond during the diamond growth process is depicted.

FIG. 5 is a diagram of a diamond production apparatus according to another embodiment of the present invention in which a cross-section of a deposition apparatus with a specimen holder assembly for moving the diamond during the diamond growth process is depicted.

Ex. 1, '078 patent 3:26-30, 3:36-40, 3:44-48.

9. Figures 1 through 5 of the '078 Patent each depict aspects of a sample holder that makes thermal contact with the side surfaces of a growing diamond. *Id.* at 4:44-55, 5:34-47, 8:23-46, 9:30-37, 9:66-10:54, Figs. 1-5.

RESPONSE: Plaintiffs object to this proposed fact as vague, in particular as to the terms “depict,” “aspects,” and “a sample holder.” To the extent IIa is proposing as a fact that each of these figures is depicting the *same* sample holder (i.e., by using the language “a sample holder,” disputed, as the '078 patent states:

FIG. 1 is a diagram of a diamond production apparatus according to an embodiment of the present invention in which a cross-section of deposition apparatus with a specimen holder assembly for holding the diamond stationary during a diamond growth process is depicted.

FIG.2a is a perspective view of the deposition apparatus shown in FIG. 1.

FIG.2b is a perspective view of the diamond and sheath shown in FIG. 1.

FIG. 3 is a diagram of a diamond production apparatus according to an embodiment of the present invention in which a cross-section of a deposition apparatus with a specimen holder assembly for moving the diamond during the diamond growth process is depicted.

FIGS. 4a-4c depict cross-sectional views of holders or thermal masses that can be used in accordance with the present invention.

FIG. 5 is a diagram of a diamond production apparatus according to another embodiment of the present invention in which a cross-section of a deposition apparatus with a specimen holder assembly for moving the diamond during the diamond growth process is depicted.

Ex. 1, '078 patent 3:26-48. Otherwise, disputed as not supported by the cited evidence. Further noted that the asserted claims of the '078 patent, directed to a method for diamond production, do not recite the use of a substrate holder having any particular characteristics, and are not limited to examples of embodiments illustrated or described in the specification. *See, e.g., id.* at 14:53-62; Moffa Decl. Ex. 2, Expert Report of Karen K. Gleason Ph.D. Regarding Validity of U.S. Patent No. 6,858,078 ("Gleason '078") ¶¶ 130-153.

10. According to the '078 Patent, the sample holder acts as a heat-sink to prevent the formation of twins or polycrystalline diamond along the edges of the growth surface of the diamond. *Id.* at 4:51-55, 5:31-34.

RESPONSE: Plaintiffs object to this proposed fact as vague, in particular as to the term "the sample holder," as no predicate is provided. Disputed to the extent the proposed fact suggests there is a single "sample holder" disclosed in the '078 patent. *See Response to SOF ¶ 9, supra.* Undisputed that the '078 patent states:

Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings.

...

The sheath **134** is a holder, which makes a thermal contact with a side surface of the diamond **136** adjacent to an edge of a top surface of the diamond **136**. Because collets **132a** and **132b** are tightened onto the sheath **134** by screws **131**, the sheath **134** holds the diamond **136** in a stationary position and acts as a heat-sink to prevent the formation of twins or polycrystalline diamond along the edges of the growth surface of the diamond **136**.

Ex. 1, '078 patent 3:62-64, 4:48-55. Further noted that the asserted claims of the '078 patent, directed to a method for diamond production, do not recite the use of a substrate holder having any particular characteristics, and are not limited to examples of embodiments illustrated or described in the specification. *See, e.g., id.* at 14:53-62; Moffa Decl. Ex. 2, Gleason '078 ¶¶ 130-153.

11. According to the '078 Patent, the growth surface should extend 0 to 1.5 mm above the top of the sample holder. *Id.* at 5:1-10. By minimizing the electrical effect the substrate holder has on the plasma, higher reactor pressures (specifically, 130–400 torr) can be used. *Id.* at 9:48-65.

RESPONSE: Plaintiffs object to this proposed fact as vague, in particular as to the phrases “should extend,” “the sample holder,” and “minimizing the electrical effect the substrate holder has on the plasma.” Disputed to the extent the proposed fact suggests that there is a single “sample holder” disclosed in the '078 patent. *See Response to SOF ¶ 9, supra.* Undisputed that the '078 patent discusses a diamond production system according to an embodiment of the invention in which “the top edge of the sheath 134 is at a distance D just below the top surface or top edges of the diamond 136” and “D should be within a specified distance range, such as 0–1.5 mm.” Ex. 1, '078 patent 5:1-10. Also undisputed that the '078 patent states that:

By minimizing the electrical effect of thermal mass 364 on the plasma 341, the region within the plasma 341 in which the diamond is grown will be more uniform. In addition, higher pressure can be used in growing diamond, which will increase the growth rate of single-crystal diamond. For example, pressures can vary from 130 to 400 torr and single-crystal growth rates can be from 50 to 150 microns per hour. Using a higher pressure, such as 400 torr, is possible because the uniformity, shape and/or position of the plasma 341 are not as readily affected by thermal mass 364, which is contoured to remove heat from the edges of the growth surface of the diamond and minimizes the electrical effect of the thermal mass 364 on the plasma 341.

Ex. 1, '078 patent 9:48-60. Otherwise, disputed as not supported by the cited evidence. Further noted that the asserted claims of the '078 patent, directed to a method for diamond production, do not recite the use of a substrate holder having any particular characteristics, and are not limited to embodiments illustrated or described in the specification. *See, e.g., id.* at 14:53-62; Moffa Decl. Ex. 2, Gleason '078 ¶¶ 130-153.

12. The '078 Patent describes two processes for using these substrate holders and for how to position the diamond. *Id.* at 10:55-58, 11:12-31, 11:60-64, 12:6-46, Figs. 6, 7. In both, a pyrometer is used to measure a temperature gradient across the growth surface. *Id.* at 11:1-21, 12:6-20. If a temperature

gradient less than 20° C. cannot be maintained, the growth process is halted, and the diamond is repositioned. *Id.* at 11:12-42, 12:21-46; [sic]

RESPONSE: Plaintiffs object to this proposed fact as vague, in particular as to the terms “position” and “repositioned,” and also as to the term “these substrate holders,” as no predicate is provided. Undisputed that the ’078 patent discusses processes in accordance with embodiments of the invention in which thermal gradients of less than 20 °C. are maintained across the growth surface of a diamond, pyrometers are used to take temperature measurement, and in which the diamond can be repositioned in a holder when the growth process is suspended or while the diamond is growing. *See, e.g.,* Ex. 1, ’078 patent 11:1-31, 12:6-46. Otherwise, disputed as not supported by the cited evidence. Further noted that the asserted claims of the ’078 Patent are not limited to embodiments illustrated or described in the specification. *See, e.g., id.* at 14:53-62.

13. The ’078 Patent describes measuring temperature gradients during the growth process and using that information to adjust the process. *See* ’078 Patent at 2:12-25, 2:45-56, 6:65-7:46, 7:66-8:18, 9:66-10:20, 11:1-59, 12:6-13:3; Figs. 6, 7.

RESPONSE: Plaintiffs object to this proposed fact as vague, in particular as to the terms “the growth process” and “the process,” as no predicate is provided. Undisputed that the ’078 patent discusses apparatuses and processes in accordance with embodiments of the invention in which temperature measurements are generated and temperature of a growth surface is controlled using temperature measurements such that all temperature gradients across a growth surface are less than 20°C. *See, e.g.,* Ex.1, ’078 patent 2:45-56. Otherwise, disputed as not supported by the cited evidence.

Further disputed as immaterial, given that the ’078 patent does not claim “measuring temperature gradients”; it claims “controlling temperature of a growth surface of the diamond such that all temperature gradients across the growth surface are less than 20° C.” *Id.* at claims 1 & 12. The Court rejected a

construction of the patent that would require direct measurement. ECF No. 46 at 14-17. The specification describes a variety of factors that can be used to control the temperature gradients. Ex. 1, '078 Patent at 6:55-65; Moffa Decl. Ex. 2, Gleason '078 ¶¶ 60, 130-93. This can be accomplished without direct measurement. Moffa Decl. Ex. 2, Gleason '078 ¶¶ 234, 244, 252, 262.

14. The '078 Patent states that “[t]he ability to control all of the temperature gradients across the growth surface of the diamond 136 is influenced by several factors,” including:

the heat sinking capability of the stage 124, the positioning of the top surface of the diamond in the plasma 141, the uniformity of the plasma 141 that the growth surface of the diamond is subjected to, the quality of thermal transfer from edges of the diamond via the holder or sheath 134 to the stage 124, the controllability of the microwave power, coolant flow rate, coolant temperature, gas flow rates, reactant flow rate and the detection capabilities of the infrared pyrometer 142.

Id. at 6:55-65.

RESPONSE: Undisputed that the patent so states.

15. The '078 Patent states that growth usually continues as long as the diamond “is smooth in nature, without isolated ‘outcroppings’ or twins.” *Id.* at 13:4-10. It further states that this condition “may be verified visually.” *Id.*

RESPONSE: Plaintiffs object to this proposed fact as vague, in particular as to the terms “growth,” “usually continues,” and “this condition.” Undisputed that IIa has accurately quoted portions of the '078 patent, but Plaintiffs dispute any implications resulting from IIa’s partial quotations without full context. For example, disputed that visual inspection is conclusive to demonstrate whether a diamond is (or is not) single-crystal, as that term has been construed by the Court. Ex. 18, Vohra Dep. at 80:17-83:19; Ex. 4, Hemley Dep. at 261:10-15; *see also* ECF No. 46 at 27-29 (construing single-crystal).

16. According to the '078 Patent, the process temperature can be selected from 900–1400° C., depending on whether oxygen is used. *Id.* at 13:22-24.

RESPONSE: Disputed. The cited portion of the '078 patent states that “[t]he process temperature may be selected from a range of *about* 900-1400°C, depending on the particular type of single-crystal diamond that is desired or if oxygen is used.” Ex. 1, '078 patent at 13:22-24 (emphases added). Disputed whether that a person of ordinary skill in the art would understand the '078 patent’s claimed invention or disclosure is limited to processes including the use of oxygen, irrespective of temperature. Moffa Decl. Ex. 2, Gleason '078 ¶¶ 336-45.

17. The '078 patent provides the table below to show the results of different temperatures without the use of oxygen. *Id.* at 14:8-28, tbl. 1.

TABLE 1

<u>Process temperatures for various types of diamond</u>	
Temperature Range	Type of Diamond Produced
<1000° C.	Spherical, black diamond-like carbon (DLC)
1000–1100° C.	Smooth dark brown
1100–1200° C.	Brown
1200–1220° C.	Smooth, yellow tint growth
1220–1400° C.	Step-flow type with pyramid like octahedra tinted yellow
>1300° C.	Twinned or polycrystalline diamond

RESPONSE: Plaintiffs object to this proposed fact as vague, in particular as to the term “to show the results of different temperatures without the use of oxygen.” Undisputed that IIa has accurately reproduced TABLE 1 of the '078 patent but disputed that this table was provided to show the results of different temperatures without the use of oxygen. A person of ordinary skill in the art would understand that Table 1 in the patent lists the results from the specific process used in one example of the claimed process (described in Example 1); it does not mean that the same results would be achieved, or that a person of ordinary skill in the art would understand the same results would be achieved, under different overall process conditions. Moffa Decl. Ex. 2, Gleason '078 ¶ 341.

18. The '078 Patent teaches using a pressure of about 130-400 torr. *Id.* at 13:27-29.

RESPONSE: Plaintiffs object to this proposed fact as vague, in particular as to the term “using a pressure,” since no context is given. Undisputed that the '078 patent discusses methods in accordance with exemplary embodiments of the invention in which a pressure of about 130-400 torr is used during the growth process.

19. The '078 Patent provides two examples of diamonds grown according to the described methods. *Id.* at 13:38-14:39. In Example 1, the pressure was 160 torr, the temperature was 1220° C., the methane concentration was 12% (CH₄/H₂), and the nitrogen concentration was 3% (N₂/CH₄). *Id.* at 13:51-55. The resulting diamond grew to a thickness of 0.7 mm. *Id.* at 13:57-59. It had only “a small degree of polycrystallinity localized at the top edges.” *Id.* at 13:66-14:1. Example 2 was grown to 0.6 mm thick using the same conditions as Example 1, except 1–3% oxygen was added, and the temperature was 900° C. *Id.* at 14:30-34. According to the '078 Patent, the additional oxygen allows a lower growth temperature. *Id.* at 14:34-37.

RESPONSE: Plaintiffs object to this proposed fact as vague, in particular as to the terms “provides two examples” and “only.” Disputed that only two examples were presented, as the '078 patent presents results of “additional experiment.” Ex.1, '078 patent 14:13-14. Undisputed that, in Example 1 of the '078 patent, diamond growth was performed at 160 torr pressure using gas concentrations of 3% N₂/CH₄, and 12% CH₄/H₂, and the process temperature was 1220 °C. *Id.* at 13:57-59. Denied that the resulting diamond grew to a thickness of 0.7 mm. The “resulting diamond was 4.2x4.2x2.3 mm³ unpolished, and represented about 0.7 mm of growth on the seed crystal that was grown at a growth rate 58 microns per hour.” *Id.* Undisputed that IIa quotes Ex.1, '078 patent 13:66-14:1, accurately but Plaintiffs deny any implication from the word “only.” Undisputed that, in Example 2, CVD single crystal diamond over 0.6 mm in thickness was created in accordance with the procedure of Example I but with 1-3% of oxygen added and a

growth temperature of 900 degrees Celsius. *Id.* at 14:30-34. Undisputed that the '078 patent states “the added oxygen allows a lower growth temperature.” *Id.* at 14:34-37. Disputed whether a person of ordinary skill in the art would understand the '078 patent’s claimed invention or disclosure is limited to processes including the use of oxygen, irrespective of temperature. Moffa Decl. Ex. 2, Gleason '078 ¶¶ 336-45.

20. To provide “[a]dditional information with regard to the diamond produced in the examples described above,” the '078 Patent expressly incorporates by reference “Very High Growth Rate Chemical Vapor Deposition of Single-Crystal Diamond” Proceedings of the National Academy of the Sciences, Oct. 1, 2002, volume 99, no. 20., pages 12523-12525,” (hereinafter “*Yan-3*”) a scientific paper by the inventors. *Id.* at 14:43-49 (citing Ex. 3).

RESPONSE: Plaintiffs object to this proposed fact as vague, in particular as to the term “to provide.” The '078 patent states: “Additional information with regard to the diamond produced in the examples described above is in a paper by the inventors entitled ‘Very High Growth Rate Chemical Vapor Deposition of Single-Crystal Diamond’ Proceedings of the National Academy of the Sciences, Oct. 1, 2002, volume 99, no. 20., pages 12523-12525, which is hereby incorporated by reference in its entirety.” Ex.1, '078 patent 14:43-49. Denied that the publication was cited or incorporated by reference to provide additional information, since it was only noted that additional information was described in the publication.

21. *Yan-3* describes a diamond grown using a pressure of 160 torr, a temperature of 1220° C., a methane concentration of 12% (CH₄/H₂), and a nitrogen concentration of 3% (N₂/CH₄). Ex. 3 at 1-2. The resulting diamond was 0.7 mm thick. *Id.* at 2. It had only “a small degree of polycrystallinity or twinning” that was “localized on the edge.” *Id.* A picture of that diamond appears below.

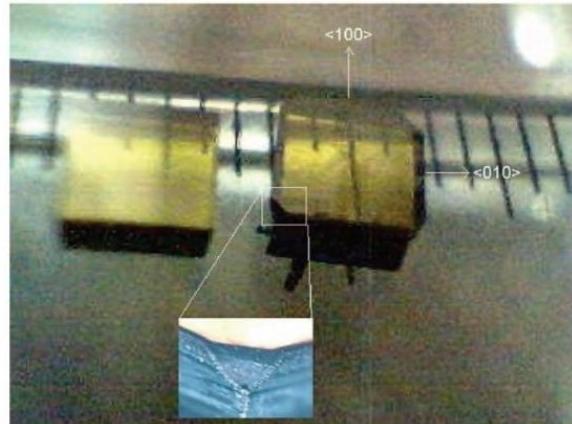


Fig. 1. Photograph of seed and as-grown unpolished CVD diamond and a magnification of CVD-diamond corner. The (100) direction corresponds to the four sides of the diamond cube.

Ex. 3 at Fig. 1

RESPONSE: Plaintiffs object to this proposed fact as vague and unintelligible, in particular as to the terms “using a pressure of 160 torr,” “a temperature of 1220° C.,” “methane concentration of 12% (CH₄/H₂),” “nitrogen concentration of 3% (N₂/CH₄),” “the resulting diamond,” “0.7 mm thick,” and “only.” For example, it is unclear what the temperature and fluctuations were, whether CH₄/H₂ and N₂/CH₄ ratios are relevant metrics. Denied that the diamond was grown using a methane concentration of 12%, and a nitrogen concentration of 3%, since the reference shows the concentrations were 10.6800% (methane) and 0.0032% (nitrogen). Ex. 3 at 1-2. Denied that the diamond had “only” a small degree of polycrystallinity or twinning, since the reference indicates that “[t]he slight broadening of grown CVD diamond indicates a small degree of polycrystallinity or twinning,” but does not further limit or quantify this statement, and the reference goes on to state that “considerable spherical diamond-like carbon exists on the edge and corner.” *Id.* at 12524. Undisputed that *Yan-3* states that “any polycrystalline character of the CVD diamond is localized on the edge.” Disputed that Dr. Hemley’s statement addresses whether the referenced diamond is, or is not, single crystal, as that term has been construed by the Court. *See* Ex. 4 at 260:10-261:15; *see* ECF No. 46 at 27-29 (construing single crystal). Undisputed that Fig. 1 purports to

show a picture of this diamond. Plaintiffs dispute any implication that this diamond limits the scope of the claims of the '078 patent.

22. Dr. Hemley, one of the named inventors, testified that only “a very, very small amount” of the material in that diamond was polycrystalline—so little “[i]t is basically not visible in the optical image.” Ex. 4 at 260:10-261:15.

RESPONSE: Plaintiffs object to this proposed fact as vague and unintelligible. Undisputed that Dr. Hemley so stated. Disputed that Dr. Hemley’s statement addresses whether the referenced diamond is, or is not, single crystal, as that term has been construed by the Court. *See* Ex. 4 at 260:10-261:15; *see* ECF No. 46 at 27-29 (construing single crystal). In fact, Dr. Hemley also testified that processes such as that used in *Yan-3* can result in “diamond that’s not black and diamond-like carbon at lower temperature.” Moffa Decl. Ex. 4, Hemley Dep. at 137:12-138:2.

23. *Yan-3* states that “the growth morphology and color strongly depend on temperature,” and teaches that “spherical black diamond-like carbon was produced below 1,000° C . . .” Ex. 3 at 1.

RESPONSE: Undisputed that *Yan-3* so stated. Disputed that the cited evidence establishes whether the “spherical black diamond-like carbon was produced below 1,000° C” was or was not single-crystal diamond, or that a person of ordinary skill in the art would understand from *Yan-3* that all processes using temperatures below 1000° C would not result in single-crystal diamond. Moffa Decl. Ex. 2 (Gleason '078 ¶¶ 339, 343-45); Moffa Decl. Ex. 4, Hemley Dep. at 137:12-138:2.

II. THE '078 PATENT IS NOT INFRINGED AND IS INVALID

A. The Asserted '078 Patent Claims Are Not Infringed

1. Defendants do not infringe the '078 Patent, literally or under the doctrine of equivalents

a. Defendants and Development of 2AT's Accused Process

24. 2AT is the only Defendant that grows diamonds. Ex. 5 at 38:11-39:14; Ex. 6 at 49:2-9, 53:14-54:1, 76:10-18.

RESPONSE: Plaintiffs object to this proposed fact as vague, in particular as to the phrases “only Defendant” and “grows diamonds.” Plaintiffs further object to the proposed fact as calling for information outside of Plaintiffs’ possession, custody, or control, and as unsupported by the cited evidence, which does not confirm that IIa grows diamonds. Subject to Plaintiffs’ objections, undisputed that 2A is the only defendant in this case that grows the diamonds accused of infringement.

25. 2AT grows diamonds outside the United States, in Singapore. Ex. 5 at 38:11-39:14.

RESPONSE: Undisputed.

26. [REDACTED]

[REDACTED] *Id.* at 43:25-44:9; *see also id.* at 101:2-17.

RESPONSE: Plaintiffs object to this proposed fact as vague, in particular as to the phrases [REDACTED]

[REDACTED]
Plaintiffs further object to the proposed fact as calling for information outside of Plaintiffs’ possession, custody, or control. Subject to Plaintiffs’ objections, undisputed that the quoted language appears in the cited exhibit. Disputed to the extent that records supporting this alleged research have been produced in this matter. Regardless, the proposed fact is immaterial to any issue raised in this motion.

27. From [REDACTED]

[REDACTED] Ex. 7 at 18:19-20:15. This work was patented. *Id.*

RESPONSE: Plaintiffs object to this proposed fact as vague, in particular as to the phrases [REDACTED]

Plaintiffs further object to the proposed fact as calling for information outside of Plaintiffs' possession, custody, or control. Plaintiffs further object to this proposed fact as not supported by any documentary evidence. Disputed that this is material to any issue presented in IIa's motion, as [REDACTED] is not an element of the claims and [REDACTED] does not support its claim that it does not infringe the patents-in-suit. Subject to Plaintiffs' objections, undisputed that this testimony appears in the cited exhibit. Regardless, the proposed fact is immaterial to any issue raised in this motion.

28. During this time period, 2AT also [REDACTED]

[REDACTED]
[REDACTED]
[REDACTED] *Id.* at 20:3-15.

RESPONSE: Plaintiffs object to this proposed fact as vague, in particular as to the phrases "[d]uring this time period," [REDACTED]

[REDACTED] Plaintiffs further object to the proposed fact as calling for information outside of Plaintiffs' possession, custody, or control. Plaintiffs further object to this proposed fact as not supported by any documentary evidence. Disputed that this is material to any issue presented in PGD's motion, [REDACTED] does not support its claim that it does not infringe the patents-in-suit. Subject to Plaintiffs' objections, undisputed that the quoted language appears in the cited exhibit. Disputed to the extent that records supporting this alleged research have been produced in this matter. Regardless, the proposed fact is immaterial to any issue raised in this motion.

29. Around 2008, 2AT tried to improve the color of 2AT's diamonds using diborane gas. *Id.* at 18:19-20:2. This work was also patented. *Id.* [REDACTED]

[REDACTED]

RESPONSE: Plaintiffs object to this proposed fact as vague, in particular as to the phrases “[a]round 2008,” “tried to improve the color,” [REDACTED] “[t]his work was also patented,” [REDACTED] [REDACTED] Plaintiffs further object to the proposed fact as calling for information outside of Plaintiffs’ possession, custody, or control. Plaintiffs further object to this proposed fact as not supported by any documentary evidence. Disputed that this is material to any issue presented in IIa’s motion, as color is not an element of the claims and [REDACTED] [REDACTED] does not support its claim that it does not infringe the patents-in-suit. Subject to Plaintiffs’ objections, undisputed that the quoted language and summarized testimony appears in the cited exhibit. Regardless, the proposed fact is immaterial to any issue raised in this motion.

30. This is when 2AT [REDACTED]

[REDACTED] *Id.* at 264:18-266:6. Dr. Misra testified that [REDACTED]
[REDACTED] *Id.* at 27:17-28:11; Ex. 5, Mehta Dep. Tr. at 222:22-223:4; 226:17-228:13.

RESPONSE: Plaintiffs object to this proposed fact as vague, in particular as to the phrases “[t]his is when,” “hit on,” [REDACTED] “afterwards,” [REDACTED]
[REDACTED] Plaintiffs further object to the proposed fact as calling for information outside of Plaintiffs’ possession, custody, or control. Plaintiffs further object to this proposed fact as not supported by any documentary evidence. Disputed that this is material to any issue presented in IIa’s motion, [REDACTED] does not support its claim that it does not infringe the patents-in-suit. Subject to Plaintiffs’ objections, undisputed that the

quoted language appears in the cited exhibits. Regardless, the proposed fact is immaterial to any issue raised in this motion.

31. [REDACTED]

Ex. 7 at 22:7-10.

RESPONSE: Plaintiffs object to this proposed fact as vague, in particular as to the phrases [REDACTED]

[REDACTED] Plaintiffs further object to the proposed finding of fact as calling for information outside of Plaintiffs' possession, custody, or control. Plaintiffs further object to this proposed fact as not supported by any documentary evidence. Disputed that this is material to any issue presented in IIa's motion, [REDACTED] does not support its claim that it does not infringe the patents-in-suit. Subject to Plaintiffs' objections, undisputed that this testimony appears in the cited exhibits. Regardless, the proposed fact is immaterial to any issue raised in this motion.

32. [REDACTED]

[REDACTED]
[REDACTED]

RESPONSE: Plaintiffs object to this proposed fact as vague, in particular as to the phrases [REDACTED].

[REDACTED]." Plaintiffs further object to the proposed finding of fact as calling for information outside of Plaintiffs' possession, custody, or control. Plaintiffs further object to this proposed fact as not supported by any documentary evidence. Exhibit 117 to the Rebuttal Expert Report of Dr. Nebel Regarding Non-Infringement of the '078 Patent contains a number of drawings, but the majority of the drawings are undated. Disputed that this is material to any issue presented in IIa's motion, [REDACTED] does not support its claim that it does not infringe the patents-in-suit. Regardless, the proposed fact is immaterial to any issue raised in this motion.

b. Description of 2AT's Accused Process

33. [REDACTED]

[REDACTED] See Ex. 5 at 198:11-199:13; Ex. 7 at 44:8-45:25.

RESPONSE: Plaintiffs object to this proposed fact as vague, in particular as to the phrases [REDACTED]

[REDACTED] Plaintiffs further object to the proposed finding of fact as calling for information outside of Plaintiffs' possession, custody, or control. Plaintiffs further object to this proposed fact as not supported by any documentary evidence. Disputed this is material to any issue presented in IIa's motion, [REDACTED] does not support its claim that it does not infringe the patents-in-suit. Subject to Plaintiffs' objections, undisputed that this testimony appears in the cited exhibits.

34. [REDACTED]

[REDACTED]. Ex. 7 at 44:8-45:25; Ex. 5 at 196:1-198:10.

RESPONSE: Plaintiffs object to this proposed fact as vague, in particular as to the phrase [REDACTED]

[REDACTED] Plaintiffs further object to the proposed finding of fact as calling for information outside of Plaintiffs' possession, custody, or control. Plaintiffs further object to this proposed fact as not supported by any documentary evidence. Disputed this is material to any issue presented in IIa's motion, as [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]

The judge in the Singapore Litigation did not believe 2A's process had not been reduced to writing, and ultimately discredited the assertion and concluded it was a misrepresentation to avoid liability: "I disbelieve Mr Mehta's statement that the defendant's method of manufacturing CVD diamonds had not been documented before. . . In my judgment, the defendant did not want to risk the possibility of the drawing of an adverse inference from the non-disclosure of its process . . . Under these circumstances, it designed a Confidential Process that [rest of sentence redacted]. This was contrived so as to avoid liability for infringement." *Id.* ¶¶ 453-454. Subject to Plaintiffs' objections, undisputed that this testimony appears in the cited exhibits. Regardless, the proposed fact is immaterial to any issue raised in this motion.

35. [REDACTED]

[REDACTED]

[REDACTED]

Ex. 8; *see also generally* Ex. 9; Ex. 10 at ¶ 153.

RESPONSE: Plaintiffs object to this proposed fact as vague, in particular as to the phrase [REDACTED]

[REDACTED] Plaintiffs further object to the proposed finding of fact as calling for information outside of Plaintiffs' possession, custody, or control. Plaintiffs further object to this proposed fact as not supported by any documentary evidence. Disputed this is material to any issue presented in IIa's motion, as [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED] The judge in the Singapore Litigation did not believe 2A's process had not been reduced to writing, and ultimately discredited the assertion and concluded it was a misrepresentation to avoid liability: "I disbelieve Mr Mehta's statement that the defendant's method of manufacturing CVD diamonds had not been documented before. . . In my judgment, the defendant did not want to risk the possibility of the drawing of an adverse inference from the non-disclosure of its process. . . Under these circumstances, it designed a Confidential Process that [rest of sentence redacted]. This was contrived so as to avoid liability for infringement." *Id.* ¶¶ 453-454. Subject to Plaintiffs' objections, undisputed that the quoted language appears in the cited exhibits. Regardless, the proposed fact is immaterial to any issue raised in this motion.

36. Dr. Misra testified that the [REDACTED]

[REDACTED] Ex. 7 at 46:1-5, 53:18-54:9, 63:9-64:6, 103:3-21,

110:11-111:3, 118:12-119:2.

RESPONSE: Plaintiffs object to this proposed fact as vague, in particular as to the phrase [REDACTED]

[REDACTED] Plaintiffs further object to the proposed finding of fact as calling for information outside of Plaintiffs' possession, custody, or control. Plaintiffs further object to this proposed fact as not supported by any documentary evidence. Disputed this is material to any issue presented in IIa's motion, as [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED] Moffa Decl. Ex. 6, Nebel 10/25/20 Dep. at 114:10-121:16. Subject to Plaintiffs' objections, undisputed that this testimony appears in the cited exhibits.

37. [REDACTED]
[REDACTED]
[REDACTED]


RESPONSE: Plaintiffs object to this proposed fact as vague, in particular as to the phrase [REDACTED]

[REDACTED] Plaintiffs further object to the proposed finding of fact as calling for information outside of Plaintiffs' possession, custody, or control. Plaintiffs further object to this proposed fact as not supported by any contemporaneous documentary evidence, [REDACTED]

[REDACTED] Disputed this is material to any issue presented in IIa's motion, as [REDACTED] does not support its claim that it does not infringe the patents-in-suit. Subject to Plaintiffs' objections, undisputed that this information appears in the cited exhibits.

38. [REDACTED]

[REDACTED] See Ex. 12 at ¶ 83. [REDACTED] See generally Ex. 13.

[REDACTED]

RESPONSE: Plaintiffs object to this proposed fact as vague, in particular as to the phrase [REDACTED] [REDACTED] “types,” and “2AT’s process.” Plaintiffs further object to the proposed finding of fact as calling for information outside of Plaintiffs’ possession, custody, or control. Disputed this is material to any issue presented in IIa’s motion, as [REDACTED] do not support its claim that it does not infringe the patents-in-suit. Further disputed as contradicting the testimony of 2AT’s own expert, [REDACTED]

[REDACTED]
[REDACTED] Moffa Decl. Ex. 6, Nebel 10/25/20 Dep. at 114:10-121:16.

Subject to Plaintiffs’ objections, undisputed that the depicted drawings appear in the cited exhibits.

39. [REDACTED]

[REDACTED]. Ex. 7 at 58:20-59:21; *see also* Ex. 13 at 1, 3. [REDACTED]

[REDACTED] are shown below. Ex. 13 at 1, 3; *see also* Ex. 7 at 59:22-25.

[REDACTED]

RESPONSE: Plaintiffs object to this proposed fact as vague, in particular as to the phrase

[REDACTED] and [REDACTED] Plaintiffs further object to the

proposed finding of fact as calling for information outside of Plaintiffs' possession, custody, or control.

Disputed this is material to any issue presented in IIa's motion, [REDACTED] designs do not support its claim that it does not infringe the patents-in-suit. Subject to Plaintiffs' objections, undisputed that the depicted drawings are annotated versions of drawings that appear in the cited exhibits.

40. [REDACTED]
[REDACTED]
[REDACTED]

[REDACTED] **RESPONSE:** Plaintiffs object to this proposed fact as vague, in particular as to the phrase [REDACTED]

[REDACTED] Plaintiffs further object to the proposed finding of fact as calling for information outside of Plaintiffs' possession, custody, or control. Disputed this is material to any issue presented in IIa's motion, as [REDACTED] do not support its claim that it does not infringe the patents-in-suit. Subject to Plaintiffs' objections, undisputed that these photographs appear in the cited exhibits.

41. A [REDACTED]. Ex. 9 at 15-16.

As shown below, the [REDACTED]

[REDACTED] Ex. 5 at 103:18-25; Ex. 7 at 58:20-59:7; Ex. 13 at 1, 3.

[REDACTED]

RESPONSE: Plaintiffs object to this proposed fact as vague, in particular as to the phrases “[a]

[REDACTED] “[REDACTED]
“such that,” [REDACTED] and [REDACTED].” Plaintiffs further object to the proposed finding of fact as calling for information outside of Plaintiffs’ possession, custody, or control. Disputed this is material to any issue presented IIa’s motion, as [REDACTED]
[REDACTED] do not support its claim that it does not infringe the patents-in-suit. Subject to Plaintiffs’ objections, undisputed that the depicted drawings and testimony appear in the cited exhibits.

42. [REDACTED]

[REDACTED] Ex. 13 at 18–19; Ex. 7 at 73:17-74:6; Ex. 15 at 30:11-16.

RESPONSE: Disputed. The cited evidence does not support this proposed fact. Disputed that Ex. 13 at 18-19 supports this proposed fact, as Ex. 13 contains only information about [REDACTED]
[REDACTED]
[REDACTED] and as Ex. 13 does not contain any pages 18-19. Disputed that Ex. 7 at 73:17-74:6 and Ex. 15 at 30:11-16 support this proposed fact, as the cited passages do not contain, e.g., [REDACTED]

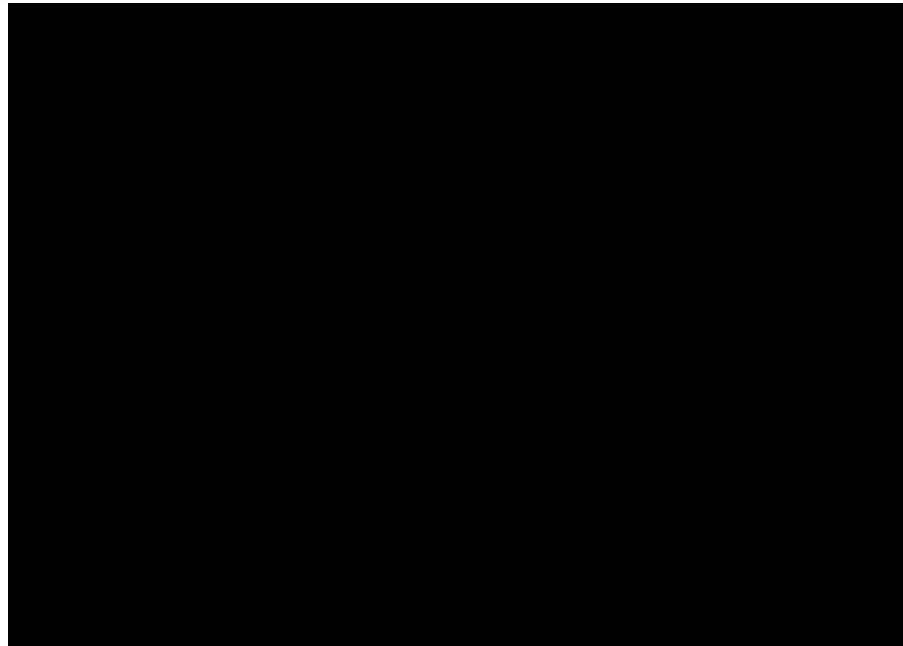
[REDACTED] Plaintiffs object to this proposed fact as vague, in particular as to the phrases [REDACTED] “to measure,” [REDACTED]

[REDACTED] Plaintiffs further object to the proposed finding of fact as calling for information outside of Plaintiffs’ possession, custody, or control. Disputed this is material to any issue presented in IIa’s motion, as [REDACTED]

[REDACTED] do not support its claim that it does not infringe the patents-in-suit.

43. [REDACTED]

(shown below). Ex. 13 at 19; Ex. 16 at 1-3; *see also* Ex. 15 at 30:17-31:15.



RESPONSE: Disputed. The cited evidence does not support this proposed fact. Disputed that Ex. 13 at 19 supports this proposed fact, as Ex. 13 [REDACTED] [REDACTED]; and as Ex. 13 does not contain any page 19. Disputed that Ex. 16 at 1-3 supports this proposed fact, as Ex. 16 contains only [REDACTED] with no indication of what they depict or how they purportedly relate to this proposed fact. Disputed that Ex. 15 at 30:17-31:15 supports this proposed fact, as the cited passage does not contain, e.g., any information about introduction of process gases for growth. Plaintiffs object to this proposed fact as vague, in particular as to the phrases [REDACTED] and [REDACTED]. Plaintiffs further object to the proposed finding of fact as calling for information outside of Plaintiffs' possession, custody, or control. Disputed this is material to any issue presented in IIa's motion, as [REDACTED] do not support its claim that it does not infringe the patents-in-suit, and in particular, [REDACTED] [REDACTED]. Subject to Plaintiffs' objections, undisputed that this photograph appears in the cited exhibits.

44. [REDACTED]

[REDACTED] Ex. 7 at 131:12- 132:24, 136:18-

137:5. [REDACTED]

[REDACTED]. Ex. 5 at 119:19-121:9; Ex. 7 at 131:12-132:24, 136:18-137:5, 162:15-163:6, 253:7-254:12; Ex. 15 at 59:17-61:18, 63:2-11, 132:20-25. [REDACTED]

[REDACTED] Ex. 5 at 97:24-98:4; Ex. 7 at 22:7-18.

RESPONSE: Plaintiffs object to this proposed fact as vague, in particular as to the phrases [REDACTED]

“occasionally used,” “[REDACTED].” and [REDACTED]

[REDACTED] Plaintiffs further object to the proposed finding of fact as calling for information outside of Plaintiffs’ possession, custody, or control. Plaintiffs further object to this proposed fact as not supported by any documentary evidence. Disputed this is material to any issue presented in IIa’s motion, as [REDACTED]

[REDACTED] do not support its claim that it does not infringe the patents-in-suit, and in particular, [REDACTED]

[REDACTED]. Subject to Plaintiffs’ objections, undisputed that this testimony appears in the cited exhibits.

45. [REDACTED]. Ex. 12 at ¶ 79; *see also* Ex. 17 at 1; *see also* Ex. 5 at 120:6-121:23.

RESPONSE: Undisputed that the documents so state. Plaintiffs object to the proposed finding of fact as calling for information outside of Plaintiffs’ possession, custody, or control. Plaintiffs further object to this proposed fact as not supported by any documentary evidence. Disputed this is material to any issue presented in IIa’s motion, [REDACTED] not support its claim that it does

not infringe the patents-in-suit, and in particular, [REDACTED]

[REDACTED].

46. [REDACTED] [REDACTED]

[REDACTED] Ex. 12 at ¶ 79; *see also* Ex. 5 at 97:23-100:4; Ex. 7 at 149:15-150:2; Ex. 17 at 1.

RESPONSE: Undisputed that the documents so state. Plaintiffs object to the proposed finding of fact as calling for information outside of Plaintiffs' possession, custody, or control. Plaintiffs further object to this proposed fact as not supported by any documentary evidence. Disputed this is material to any issue presented in IIa's motion, as [REDACTED] do not support its claim that it does not infringe the patents-in-suit, and in particular, [REDACTED]

[REDACTED].

47. [REDACTED] Ex. 17 at 1; Ex. 5 at 238:12-14.

RESPONSE: Undisputed that the documents so state. Plaintiffs object to the proposed finding of fact as calling for information outside of Plaintiffs' possession, custody, or control. Plaintiffs further object to this proposed fact as not supported by any documentary evidence. Disputed this is material to any issue presented in IIa's motion, as [REDACTED] do not support its claim that it does not infringe the patents-in-suit, and in particular, [REDACTED]

[REDACTED].

48. In [REDACTED] Ex. 7 at

39:17-19; Ex. 5 at 89:3-6, 149:9-12; *see also generally* Ex. 17 at 1.

RESPONSE: Undisputed for purposes of this motion.

49. The [REDACTED]

[REDACTED]. Ex. 13 at 22-23; Ex. 5 at 209:3-13; Ex. 15 at 32:1-3; Ex. 7 at 74:21-75:19, 99:23-100:5, 103:22-104:1, 254:14-255:24.

RESPONSE: Disputed that Ex. 13 at 22-23 supports this proposed fact, as Ex. 13 contains only

[REDACTED]

[REDACTED]; and as Ex. 13 does not contain any pages 22-23. Plaintiffs

object to the proposed finding of fact as calling for information outside of Plaintiffs' possession, custody, or control. Plaintiffs further object to this proposed fact as not supported by any documentary evidence.

Subject to Plaintiffs' objections, undisputed that this testimony appears in the cited exhibits.

50. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] Ex. 13 at 23; Ex. 15 at 39:20-41:1;

Ex. 5 at 209:3-211:7, Ex. 7 at 75:23-76:4, 104:2-21, 105:6- 106:1, 107:24-108:12; Ex. 10 at ¶¶ 153, 191, 245, 248.

RESPONSE: Disputed that Ex. 13 at 23 supports this proposed fact, as Ex. 13 contains only

[REDACTED]

[REDACTED] and as Ex. 13 does not contain any page 23. Plaintiffs object to

the proposed finding of fact as calling for information outside of Plaintiffs' possession, custody, or control.

Plaintiffs further object to this proposed fact as not supported by any documentary evidence.

Furthermore, to the extent the cited evidence references [REDACTED] Plaintiffs further object to this proposed fact as not supported by any contemporaneous documentary evidence, insofar as 2A [REDACTED]

[REDACTED] Subject to Plaintiffs' objections, undisputed that this testimony appears in the cited exhibits.

51. [REDACTED]

[REDACTED]

[REDACTED] . Ex. 13 at 23; Ex. 15 at 39:20-41:1; Ex. 5 at 209:3-211:7; Ex. 7 at 75:23-76:4, 86:6-15, 103:22-108:18.

RESPONSE: Disputed that Ex. 13 at 23 supports this proposed fact, as Ex. 13 contains only [REDACTED]

[REDACTED] and as Ex. 13 does not contain any page 23. Plaintiffs object to the proposed finding of fact as calling for information outside of Plaintiffs' possession, custody, or control. Plaintiffs further object to this proposed fact as not supported by any documentary evidence. Plaintiffs object to this proposed fact as vague, in particular as to the phrase "must be ended." Subject to Plaintiffs' objections, undisputed that this testimony appears in the cited exhibits.

52. [REDACTED], and t [REDACTED]

[REDACTED] Ex. 15 at 30:25-32:22, 42:9-13; Ex. 5 at 147:13-16, 192:7-11; Ex. 7 at 104:19-105:1.

RESPONSE: Disputed. Evidence shows that [REDACTED]

[REDACTED] *See Defendants' Proposed Statement of Fact*

No. 44, *supra*; *see also* Ex. 5 at 97:24-98:4; 119:19-121:9; Ex. 7 at 22:7-18; 131:12-132:24, 136:18-137:5, Moffa Decl. Ex. 7, Misra Dep. at 162:15-163:6, 253:7-254:12; Ex. 15 at 59:17-61:18, 63:2-11, 132:20-25.

53. Dr. Vohra explained that adjusting the microwave power controls temperature, not temperature gradients. Ex. 18 at 162:6-163:1, 179:23-180:9, 211:17-213:19.

RESPONSE: Disputed that PGD has accurately characterized Dr. Vohra's testimony. Dr. Vohra unequivocally testified that "the controllability of the microwave power" was among the "factors that can influence the temperature gradients on the growth surface." Ex. 18 at 191:7-192:3. Dr. Vohra also caveated that "uniformity of the diamond temperature distribution," *i.e.* of the temperature gradients, was "a very complicated function of the heat sinking ***and the nth of power***" (emphasis added) and that—contrary to

PGD's characterization—it was “really hard to make a generalized statement” about whether adjusting microwave power could control temperature gradients. Ex. 18 at 128:9-129:19. Elsewhere, Dr. Vohra also testified that, for a given growth process, he would have to know about “[n]ot just . . . the holder design, but also the reactor design” (including *e.g.* the microwave power control) to comment on temperature gradient influence during growth. *Id.* at 189:10-22.

54. Adjusting the power of a plasma source to control temperature during diamond growth was known before the application for the '078 Patent was filed. *See* Ex. 19 at 6:6-17; Ex. 20 at 1:63-67.

RESPONSE: Plaintiffs object as vague at least for the terms “temperature” and “diamond growth.” Plaintiffs further object as irrelevant because the claims require controlling the temperature of a growth surface of the diamond, as opposed to the bulk temperature. Disputed as unsupported by the evidence to the full extent of those terms. *E.g.* Ex. 19 at 5:6-9 (“surface temperature of . . . diamond *film*”) (emphasis added); Ex. 20 at 1:63-64 (“The *substrate temperature* can be adjusted . . .”) (emphasis added).

55. [REDACTED]

[REDACTED]

[REDACTED]

RESPONSE: Disputed. Dr. Nebel’s expert report states that at his direction, [REDACTED]

[REDACTED]

[REDACTED] *See* IIa’s Statement of Facts Ex. 12 at ¶¶ 307-308. Further disputed as immaterial, given that the '078 patent does not claim [REDACTED]; it claims “controlling temperature of a growth surface of the diamond such that all temperature gradients across the growth surface are less than 20° C.” '078 patent claims 1 & 12. The Court rejected a construction of the patent that would require [REDACTED].

56.

Ex. 5 at 193:2-6; Ex. 7 at 257:22-25; see also generally Ex. 13.

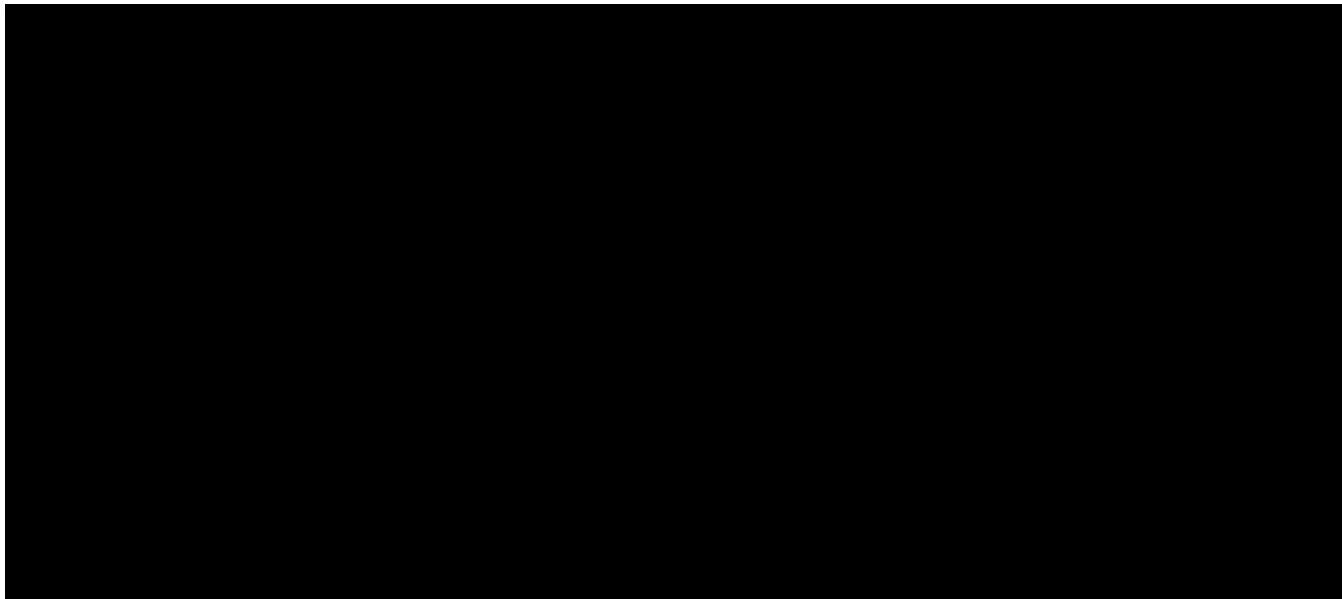
RESPONSE: Disputed.

Further disputed as immaterial, given that the '078 patent does not claim

[REDACTED]; it claims “controlling temperature of a growth surface of the diamond such that all temperature gradients across the growth surface are less than 20° C.” ’078 patent claims 1 & 12.

57.

² IIa produced images of several dozen similar examples that can be made available at the Court's request. They are collected in Exhibit 79 of the Rebuttal Expert Report of Dr. Nebel Regarding Non-Infringement of the '078 Patent.



RESPONSE: Disputed. The cited evidence does not support this proposed fact. Undisputed that Ex. 21 includes the photograph shown on the left; however, none of the cited evidence demonstrates that this photograph depicts [REDACTED]. Ex. 21 itself contains no information that can be used to deduce this proposed fact. Further disputed that Ex. 13 supports this proposed fact, as Ex. 13 contains only information [REDACTED]

[REDACTED] and as Ex. 13 does not contain any page 28. Further disputed that Ex. 7 at 119:3-120:21 supports this proposed finding of fact, as this testimony does not relate to Ex. 21 or the photo shown therein. Further disputed that Ex. 10 at ¶ 158 supports this proposed finding of fact, as this evidence does not relate to Ex. 21 or the photo shown therein. Plaintiffs object to the proposed finding of fact as calling for information outside of Plaintiffs' possession, custody, or control.

58. The photograph on the right above shows [REDACTED]

[REDACTED]³ Ex. 22 at 1;
see also Ex. 13 at 28-30; Ex. 7 at 119:3-123:7.

³ IIA produced images of several dozen similar examples that can be made available at the Court's request. They are collected in Exhibit 80 of the Rebuttal Expert Report of Dr. Nebel Regarding Non-Infringement of the '078 Patent.

RESPONSE: Disputed. The cited evidence does not support this proposed fact. Undisputed that Ex. 22 includes the photograph shown on the right; however, none of the cited evidence demonstrates that this photograph depicts [REDACTED]

[REDACTED]
Ex. 22 itself contains no useful text or information that can be used to deduce this proposed fact. Further disputed that Ex. 13 supports this proposed fact, as Ex. 13 contains only information about [REDACTED]
[REDACTED]; and as Ex. 13 does not contain any pages 28-30. Further disputed that Ex. 7 at 119:3-123:7 supports this proposed finding of fact, as this testimony does not relate to Ex. 22 or the photo shown therein. Further disputed that Ex. 10 at ¶ 158 supports this proposed finding of fact, as this evidence does not relate to Ex. 22 or the photo shown therein. Plaintiffs object to the proposed finding of fact as calling for information outside of Plaintiffs' possession, custody, or control.

59. [REDACTED] . Ex. 5 at 27:8-28:21, 247:20– 249:4; Ex. 7 at 99:9-17.

RESPONSE: Plaintiffs object to this proposed fact as vague, in particular as to the phrase [REDACTED]
[REDACTED] Plaintiffs further object to the proposed finding of fact as calling for information outside of Plaintiffs' possession, custody, or control. Plaintiffs further object to this proposed fact as not supported by any documentary evidence. Disputed this is material to any issue presented in IIa's motion, as the [REDACTED] does not support its claim that it does not infringe the patents-in-suit. Subject to Plaintiffs' objections, undisputed that this testimony appears in the cited exhibits.

c. 2AT's Process Data

60.

RESPONSE: Plaintiffs object to this proposed fact as vague, in particular as to the phrases

The image consists of four solid black horizontal bars of equal length, arranged vertically. They are positioned against a white background.

Plaintiffs further object to the proposed finding of fact as calling for

⁴ [REDACTED] are voluminous but can be made available at the Court's request. PDF versions of the reports are located at Carnegie_189_2AT-00144859 through 144982; Carnegie_189_2AT-00145040 through 145194; Carnegie_189_2AT-00145256 through 145530; Carnegie_189_2AT-00145585 through 145741; Carnegie_189_2AT-00145780 through 145904; and Carnegie_189_2AT-00145907 through 145927.

⁵ [REDACTED] are voluminous but can be made available at the Court's request. PDF versions of the reports are located at Carnegie_189_2AT-00000577 through 56564. Excel spreadsheets containing the data from the [REDACTED] are located at Exhibits 105 through 110 of the Rebuttal Expert Report of Dr. Nebel Regarding Non-Infringement of the '078 Patent.

6 [REDACTED] are voluminous but can be made available at the Court's request. PDF versions of the reports are located at Carnegie_189_2AT-00056565 through 104356. Excel spreadsheets containing the data from the [REDACTED] are located at Exhibits 111 through 116 of the Rebuttal Expert Report of Dr. Nebel Regarding Non-Infringement of the '078 Patent.

information outside of Plaintiffs' possession, custody, or control. Subject to Plaintiffs' objections, undisputed that IIa has produced documents purporting to be [REDACTED]

61. Defendants' expert Dr. Nebel [REDACTED]

[REDACTED] Ex. 12 at ¶ 344. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

RESPONSE: Undisputed.

62. Plaintiffs' expert Dr. Capano acknowledges the following: [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] Ex. 10 at ¶ 248.

RESPONSE: Disputed insofar as Dr. Capano's report does not expressly "acknowledge[]" this, but instead paraphrases one of 2A's [REDACTED]

[REDACTED] Ex. 10 ¶245. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] Compare Ex. 5

at 41:14-24 with Ex. 12 at ¶ 312 n.26; *cf.* Ex. 2 at 2 (stating that Plaintiffs were "without the benefit of direct access and inspection of Defendants' manufacturing processes and those of its suppliers and/or vendors"). Further, in reference to this [REDACTED]

[REDACTED] Ex. 7 at 104:9-21.

63. After examining the [REDACTED] information provided by 2AT, Defendants' expert Dr. Nebel found that the [REDACTED]

[REDACTED] Ex. 12 at ¶ 340.

RESPONSE: Undisputed.

64. [REDACTED]

[REDACTED]

[REDACTED] Ex. 10 at ¶ 136 (citation omitted); *see also id.* at ¶ 137.

RESPONSE: Disputed insofar as Dr. Capano's report does not expressly "acknowledge[]" this, but instead paraphrases evidence produced by IIa. *See* Moffa Decl. Ex. 1, Expert Report of Michael Capano, Ph.D. Regarding Infringement of U.S. Patent Nos. 6,858,078 and RE41,189 ("Capano Rep.") ¶¶ 136-37 (citing 189_2AT-00134492; Mehta Dep. at 103:14-107:23; *id.* at 222:24-233:11). [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] *Compare Ex. 5 at 41:14-24 with Ex. 12, ¶ 312 n.26; cf. Ex. 2 at 2*

(stating that Plaintiffs were “without the benefit of direct access and inspection of Defendants’ manufacturing processes and those of its suppliers and/or vendors”).

65. Defendants’ expert Dr. Nebel analyzed [REDACTED]

[REDACTED] Ex. 12 at ¶ 533. He also examined the [REDACTED] and testimony from 2AT’s witnesses. *See id.* Dr. Nebel found that the data confirms the [REDACTED] and testimony. *Id.* Dr. Nebel prepared the chart below to visually summarize all of the [REDACTED]. *Id.*

[REDACTED]

RESPONSE: Denied. The cited evidence does not support this proposed fact, insofar as Ex. 12 does not contain a paragraph numbered 533, nor does it contain the image depicted in this proposed fact.

66. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]]. *Id.* at ¶ 320. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

RESPONSE: Denied. These results are contradicted by the experiments of Plaintiffs' expert Dr. Capano. Dr. Capano performed experiments designed to investigate 2A's asserted temperature and pressure conditions and to explain the underlying physical principles active during growth under such conditions." Ex. 10 ¶ 308. Dr. Capano exposed a diamond seed to conditions more closely matching those 2A uses in its commercial SCP diamond production, namely, [REDACTED]. *Id.* ¶ 320. The experiment demonstrated uniform diamond growth and the lack of a temperature gradient exceeding 20 °C. *Id.* Dr. Capano further performed a Finite Element Analysis ("FEA"), which modeled the heat transfer from the plasma to the diamond, and particularly focused on uniform plasmas like 2A's. *Id.* ¶ 196. Based on the information obtained from 2A regarding the [REDACTED], the high thermal conductivity of diamonds, and the FEA, Dr. Capano concluded that MPCVD diamond growth at 2A using the

[REDACTED] process does not occur outside the claimed limitation of a 20 °C temperature gradient. *Id.* ¶ 210.

67. Plaintiff M7D's CTO Yarden Tsach testified that non-monocrystalline growth can cause "significant" temperature gradients and that M7D has measured them to be as much as "60, 70 degrees C." Ex. X. Tsach Dep. Tr. at 309:6–310: 19.

RESPONSE: Plaintiffs object to this paragraph as vague at least for reference to "Ex. X." See Local Rule 56.1. To the extent IIa intended to cite to Exhibit 28, Plaintiffs dispute this statement. Plaintiffs object to the term "temperature gradients" insofar as it suggests gradients on a growth surface in the context of the claims of the '078 patent. Mr. Tsach's testimony was unequivocal that the growth surface as understood by Washington Diamond does not include polycrystalline material. *E.g.* Ex. 28 at 307:7-21. Mr. Tsach's testimony was just as unequivocal that M7D has *not* "measured" the temperature gradients between the polycrystalline rim and the single crystal region. *Id.* at 309:6-20 ("The difference between the polycrystalline rim temperature and the single crystal temperature is not characterized because we are not finding this important and we're not working on this difference."). Contrary to the representation in this paragraph, the cited testimony regarding an estimated "60, 70 degrees C difference" did not reflect *anything* "measured" by M7D but was based solely on speculation. To be clear, Mr. Tsach expressly indicated in the cited testimony (1) that he "[could not] say" what the true difference would be, (2) that he had not characterized that difference, and (3) that it was "immaterial and . . . does not impact [M7D's] process." *Id.* at 310:3-14. Mr. Tsach was further clear that "we're not measuring" temperature gradients from the single crystal to the polycrystalline rim, and that such measurement would be "immaterial to . . . our process." *Id.* at 310:20-311:14. Mr. Tsach was still further clear that the "largest temperature gradient that WD has observed in connection with its manufacturing processes" was [REDACTED] *far* lower than the temperature measurements set forth in this paragraph. *Id.* at 312:2-7.

d. 2AT's Rough Diamond Blocks

68. Plaintiffs' expert Dr. Capano acknowledges [REDACTED]

[REDACTED] Ex. 10 at ¶ 95.

RESPONSE: Disputed insofar as Exhibit 10 lacks the complete statement quoted in this paragraph. Further disputed insofar as Dr. Capano's report does not expressly "acknowledge[]" this, but instead summarizes the work of another. *See* Ex. 10 ¶ 95 (discussing article produced at Carnegie_189_Defendants-00000441-50).

69. Dr. Yogesh Vohra, one of the inventors named on the '078 Patent, testified that "in this field, even if you know there is one twin, then it's not a single crystal." Ex. 18 at 81:7- 11.

RESPONSE: Undisputed that PGD has accurately transcribed Dr. Vohra's testimony, but disputed that Dr. Vohra's testimony (including reference to "this field") relates to the '078 patent, and further disputed that Dr. Vohra's reference to "single crystal" relates to that term as construed by this Court. The cited testimony refers to examination of crystals grown in connection with a thesis of one Andrew Israel, not crystals grown under the '078 patent. *See* Ex. 18 at 4 (Exhibit 8) and 80:1-83:5 (discussing "Vohra Exhibit 8"). The cited testimony further refers to "rocking curve measurements by x-ray technique to show the quality of crystal," in which "you have to put [the crystal] on the x-ray machine and tilt it to show that there's only one grain of diamond." Ex. 18 at 81:12-82:2. Dr. Vohra's testimony—that without such measurements one can only confirm that twins are "*nearly eliminated*" during growth, *id.* at 80:17-81:6 (emphasis added)—does not inform whether the presence of a single twin renders a diamond single crystal as defined in the '078 patent. Dr. Vohra was not shown the Court's claim construction order in deposition. *See id.* at 4-6 (exhibit list). Dr. Vohra was therefore not addressing the term "single crystal" as reflected in the Court's claim construction—a construction *advanced by PGD* reflecting "agree[ment] that a diamond

can still be deemed single-crystal *even if* it contains small and localized amounts of polycrystallinity or other impurities, such as . . . *twinned diamond.*” ECF No. 46 at 27-29 (emphasis added).

70. Dr. Vohra testified that if there are black spots on the surface, “[t]hat’s definitely twinning” and “definitely not single crystal.” *Id.* at 82:3-17. “Visually, you can tell.” *Id.*

RESPONSE: Disputed that Dr. Vohra testified with the phrase “definitely not single crystal” within the cited passage. Further disputed that Dr. Vohra’s testimony relates to the ’078 patent or that Dr. Vohra’s reference to “single crystal” relates to that term as construed by this Court. The cited testimony refers to examination of crystals grown in connection with a thesis of one Andrew Israel, not crystals grown under the ’078 patent. *See* Ex. 18 at 4 (Exhibit 8) and 80:1-83:5 (discussing “Vohra Exhibit 8”). Dr. Vohra’s testimony does not inform whether visual inspection of a diamond grown according to the ’078 patent can be visually inspected to determine its single crystal structure. Further, Dr. Vohra was not shown the Court’s claim construction order in deposition. *See id.* at 4-6 (exhibit list). Dr. Vohra was therefore not addressing the term “single crystal” as reflected in the Court’s claim construction—a construction *advanced by PGD* reflecting “agree[ment] that a diamond can still be deemed single-crystal *even if* it contains small and localized amounts of polycrystallinity or other impurities, such as . . . *twinned diamond.*” ECF No. 46 at 27-29 (emphasis added).

71. The ’078 Patent states that “isolated ‘outcroppings’ or twins . . . may be verified visually.” Ex. 1 at 13:4-16.

RESPONSE: Disputed that IIa has accurately characterized the ’078 patent specification. The ’078 Patent states that a “‘step growth’ condition may be verified visually,” not that “isolated ‘outcroppings’ or twins” may be so verified. Ex. 1 at 13:10 (emphasis added). Further, IIa takes the ’078 patent’s reference to visual verification out of context. The reference to visual verification in the ’078 patent is not a general statement but is limited to two exemplary growth processes set forth therein. *See id.* at 13:4 (“When

implementing process 600 and 700 . . ."); *see generally id.* at 10:55-13:3. The '078 patent nowhere states, as a general matter or otherwise, that outcroppings or twins of a diamond may be verified visually. *See generally id.*

72. The photograph below shows a physical rough diamond block that has been produced in this matter. Ex. 25. [REDACTED]



RESPONSE: Undisputed.

73. Dr. Capano does not opine on the relative amount [REDACTED]

[REDACTED] *See id.* at ¶239.

RESPONSE: Denied. Dr. Capano opined on whether the diamonds in this block had a [REDACTED]

[REDACTED] Ex. 10 ¶¶ 226-240.

74. Dr. Capano opines that [REDACTED]

[REDACTED] . *Id.* at ¶¶ 228-40.

RESPONSE: Undisputed that IIa has accurately transcribed ¶ 227 of Dr. Capano's report, and that Dr. Capano concludes that 2A's [REDACTED], but otherwise disputed. Plaintiffs further object to this paragraph as vague at least for the phrase "because they contain [REDACTED]." As that phrase is best understood, Plaintiffs submit that Dr. Capano nowhere states that his conclusions regarding the [REDACTED]

[REDACTED] Rather, Dr. Capano states that his conclusions were formed from *inter alia* three separate experiments directed to identify [REDACTED] received from 2A, resulting in parameter measurements [REDACTED].” Ex. 10 ¶ 236; *see id.* ¶¶ 231-237.

75. Dr. Capano's report states that [REDACTED]

RESPONSE: Disputed insofar as this paragraph takes Dr. Capano's statement out of its context, in which he explained the interplay of the Court's constructions of "growth surface" and "single-crystal"

diamond.” That statement in full reads: “My understanding of growth surface is also consistent with the court’s construction of ‘single-crystal diamond,’ which the court construed to mean ‘a standalone diamond [made by chemical vapor deposition] having insubstantial non-monocrystalline growth’ as it excludes [REDACTED]

[REDACTED] In contrast, if the [REDACTED]

[REDACTED] was part of the ‘growth surface’ one would not be ‘growing single-crystal diamond... on the growth surface’ as required by the claim. The growth would not be single-crystal diamond growth for the simple reason that the [REDACTED] does not provide a uniform lattice for epitaxial growth.” Ex. 10 ¶ 180.

76. [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]

RESPONSE: Disputed. The cited testimony does not establish that the [REDACTED] are visible to the human eye, nor does it establish that the [REDACTED]. Furthermore,

⁷ IIA produced images of several dozen similar examples that can be made available at the Court’s request. They are collected in Exhibit 82 of the Rebuttal Expert Report of Dr. Nebel Regarding Non-Infringement of the ’078 Patent.

the testimony cited at 95:9-22 does not relate to [REDACTED]
[REDACTED]

Further disputed to the extent that Ex. 24 purports to be photographs of [REDACTED] and to the extent Ex. 24 implies that [REDACTED] are visible to the naked eye as shown in these images. Ex. 24 itself contains no information that can be used to deduce these proposed facts, and the cited testimony does not relate to Ex. 24 or the images contained therein. Furthermore, although Ex. 24 appears to have been generated by specialized software, there is no information that indicates what equipment or hardware were used to generate Ex. 24, and under what conditions or settings.

Further disputed to the extent this proposed fact implies that the [REDACTED]
Dr. Misra testified that they are [REDACTED] Ex. 7 at 41:7-16.

Further disputed to the extent this fact implies that IIa's diamonds are not single-crystal. Dr. Capano performed experiments designed to investigate [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED] *Id.* ¶ 320. The experiment demonstrated uniform diamond growth and the lack of a temperature gradient exceeding 20 °C. *Id.* Dr. Capano further performed a FEA, which modeled the heat transfer from the plasma to the diamond, and particularly focused on uniform plasmas like 2A's. *Id.* ¶ 196. Based on the information obtained from 2A regarding the uniformity of its process, the high thermal conductivity of diamonds, and the FEA, Dr. Capano concluded that MPCVD diamond growth at 2A using the [REDACTED] and process does not occur outside the claimed limitation of a 20 °C temperature gradient. *Id.* ¶ 210.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

RESPONSE: Undisputed that IIa has accurately transcribed Ex. 15 at 44:8-19, but otherwise

disputed. Mr. Ghosh nowhere testified that 2A's process cannot [REDACTED].

Mr. Ghosh nowhere testified that anything [REDACTED]." Mr. Ghosh nowhere testified that the

[REDACTED]

This paragraph further takes Mr. Ghosh's statements out of their context discussing operator observation of 2A's process, not the process *per se*. See e.g. Ex. 15 at 43:17-45:15.

78. A plasma can couple more strongly to the edges of a growing diamond, sometimes called the "edge effect," which can cause a "temperature rise at the edges and corners" such that "dislocations, twins and other defects are more likely to occur." Ex. 26 at 3-5; Ex. 27 at 8; Ex. 28 at 201:22-202:14.

RESPONSE: Plaintiffs object to this proposed fact as vague, in particular as to the phrases "can," "couple more strongly," "a growing diamond," "edge effect," "temperature rise at the edges and corners," and "more likely to occur." Undisputed that the quoted language appears in the cited exhibits.

e. Dr. Capano's Experiments

79. Plaintiffs' expert Dr. Capano performed [REDACTED]

[REDACTED]

Ex. 10 at ¶ 309. [REDACTED] . *Id.*

RESPONSE: Disputed to the extent this proposed fact implies that [REDACTED]

[REDACTED] rendered Dr. Capano's methodology or results less reliable. Dr. Capano's experiments allowed him to draw reliable conclusions concerning 2A's process. Moffa Decl. Ex. 1, Capano Rep. ¶¶ 307-34. Otherwise, undisputed.

80. The first experiment was performed using [REDACTED]

[REDACTED] *Id.* at ¶ 310.

RESPONSE: Undisputed.

81. The second experiment was performed using a [REDACTED]

[REDACTED] *Id.* at ¶¶ 319-20.

RESPONSE: Disputed, as the cited evidence does not recite [REDACTED]

82. The third experiment was performed using [REDACTED]

[REDACTED] *Id.* at ¶ 328. [REDACTED]

[REDACTED] The run duration is not specified. *See id.* at ¶¶ 328-34.

RESPONSE: Disputed. The temperature range is not "unspecified," and it is untrue that Dr. Capano only provided temperature gradient measurement data for only one seed. Dr. Capano's complete temperature measurement data for this experiment is provided in CARN-PGD_00234536-37. Further disputed that the run duration is not specified, as the data provided in CARN-PGD_00234536-37 includes information concerning run duration. Further disputed as the cited evidence does not demonstrate that the

microwave power was [REDACTED] and as CARN-PGD_00234536-37 provides microwave power data that does not support this proposed fact.

83. A footnote in Dr. Capano's report states he grew diamonds that "suffered from cracking and other defects due to the extreme thermal stress" when grown using [REDACTED]

[REDACTED] *Id.* at ¶ 310 n.7.

RESPONSE: Undisputed, but immaterial, that Dr. Capano conducted "a separate experiment using otherwise identical conditions an attempt to [REDACTED] growth surface temperature to [REDACTED] [REDACTED] and that "[w]hile it was possible to obtain diamond growth, the material suffered from cracking and other defects due to extreme thermal stress." Ex. 10 ¶ 310 n.7. This is immaterial to 2A's process because 1) 2A does not [REDACTED] and 2) 2A does not [REDACTED] 2A states that [REDACTED]

[REDACTED] See proposed fact 84.

84. [REDACTED]

[REDACTED]. *Supra* ¶¶ 28-31, 35-39.

RESPONSE: Plaintiffs incorporate by reference their responses, objections, and disputes to proposed facts *supra* ¶¶ 28-31, 35-39. Plaintiffs also dispute this proposed fact to the extent it implies that [REDACTED] rendered Dr. Capano's methodology or results less reliable. Dr. Capano's experiments allowed him to draw reliable conclusions concerning 2A's process. Moffa Decl. Ex. 1, Capano Rep. ¶¶ 307-34.

f. Dr. Capano's Computer Model

85. Plaintiffs' expert Dr. Capano provided a computer model for "the heat transfer characteristics active on the surface of a single diamond stone." Ex. 10 at ¶ 196.

RESPONSE: Undisputed that Dr. Capano "used Finite Element Analysis (FEA)" including "engag[ing] in a series of simulations using FEA of the heat transfer characteristics active on the surface of a single diamond stone." Plaintiffs object to this proposed fact as vague, in particular as to the phrase "computer model."

86. Dr. Capano's computer model does not simulate 2AT's MPCVD process. *See id.* at ¶¶ 196-210.

RESPONSE: Disputed. Dr. Capano's FEA, which modeled the heat transfer from the plasma to the diamond, focused on uniform plasmas like 2A's. Ex. 10 ¶¶ 196, 203. Dr. Capano concluded, based on the information obtained from 2A regarding the [REDACTED], the high thermal conductivity of diamonds, and the FEA, that MPCVD diamond growth at 2A using the [REDACTED] and process does not occur outside the claimed limitation of a 20 °C temperature gradient." *Id.* ¶ 210. Plaintiffs further object to this proposed fact as vague, in particular as to the phrases "computer model," "simulate," and "2AT-s MPCVD process."

87. Dr. Capano's computer model does not simulate any MPCVD process. *See id.* at ¶¶ 196-210.

RESPONSE: Disputed. Dr. Capano's Finite Element Analysis, which modeled the heat transfer from the plasma to the diamond, focused on [REDACTED] and particularly considered the type of uniform plasma that would result from an MPCVD process. Ex. 10 ¶¶ 196, 203, 208. The FEA indicated, among other things, the temperature profile of the growing diamond and the variations in heat flux (ΔQ or just "Q") horizontally across the surface necessary to create and sustain a temperature gradient of 20 °C or more during MPCVD growth of diamonds. *Id.* ¶ 197. Dr. Capano concluded, based on the information

obtained from 2A regarding [REDACTED], the high thermal conductivity of diamonds, and the Finite Element Analysis, that MPCVD diamond growth at 2A using the [REDACTED] and process does not occur outside the claimed limitation of a 20 °C temperature gradient.” *Id.* ¶ 210. Plaintiffs further object to this proposed fact as vague, in particular as to the phrases “computer model,” “simulate,” and “any MPCVD process.”

88. Dr. Capano’s computer model does not simulate a plasma. *See id.* at ¶¶ 196-210.

RESPONSE: Disputed. Dr. Capano’s FEA, which modeled the heat transfer from the plasma to the diamond, focused on uniform plasmas like 2A’s. Ex. 10 ¶¶ 196, 203. The analysis considered size and location of the plasma and the symmetrical placement of the diamond seeds within the plasma. *Id.* ¶ 196. These studies were designed, among other things, to determine how long an imposed temperature gradient of 20 °C survives when the stage temperature and the heat flux from the plasma are uniform. *Id.* ¶ 203. Dr. Capano concluded, based on the information obtained from 2A regarding the [REDACTED], the high thermal conductivity of diamonds, and the FEA, that MPCVD diamond growth at 2A using the [REDACTED] process does not occur outside the claimed limitation of a 20 °C temperature gradient.” *Id.* ¶ 210. Plaintiffs further object to this proposed fact as vague, in particular as to the phrases “computer model,” and “simulate.”

89. Dr. Capano’s computer model does not simulate chemical reactions. *See id.* at ¶¶ 196-210.

RESPONSE: Irrelevant, as Dr. Capano’s FEA included several dynamic analyses of heat flux, which accurately reflect heat transfer under MPCVD conditions, regardless of the specific chemical reaction(s). Ex. 10 ¶¶ 203-204. Plaintiffs further object to this proposed fact as vague, in particular as to the phrases “computer model,” “simulate,” and “chemical reactions.”

90. Dr. Capano’s computer model does not simulate effects of non-monocrystalline growth. *See id.* at ¶¶ 196-210.

RESPONSE: Disputed. Dr. Capano's FEA considered the thermal conductivity of diamond, which under deposition conditions can be the same between mono-crystalline diamond and non-monocrystalline diamond. Ex. 10 ¶¶ 198, 202, 204, 210; Moffa Decl. Ex. 9, CARN-PGD_00197842-69. Plaintiffs further object to this proposed fact as vague, in particular as to the phrases "computer model," "simulate," and "effects of non-monocrystalline growth," and "non-monocrystalline growth."

g. Dr. Capano's Opinions on Equivalence

91. Dr. Capano opines that 2AT's process is equivalent because 2AT's systems include "a

[REDACTED]

[REDACTED] .” See *id.* at ¶ 252.

RESPONSE: Disputed in part. Undisputed that 2A's system includes [REDACTED]

[REDACTED]

[REDACTED] Ex. 10 ¶ 252. Disputed to the extent IIa claims or implies that 2A's is equivalent only “*because* 2AT's systems include” these components. See *id.* Rather, Dr. Capano opinions that, when 2A uses these components in conjunction with a pressure [REDACTED] it is equivalent to using these components with a pressure of 130 torr; and when 2A uses these components in conjunction with a temperature of [REDACTED] it is equivalent to using these components with a temperature [REDACTED]. *Id.* ¶¶ 252-60; ¶¶ 280-93.

92. Dr. Capano opines [REDACTED]

[REDACTED] . See *id.* at ¶¶ 252-60.

RESPONSE: Disputed that IIa has accurately characterized Dr. Capano's opinions. Dr. Capano opines that growing diamonds at [REDACTED], and 130 torr “does not change the way the diamonds [are] grown or the end product. *Id.* ¶ 260. What's more, Dr. Capano opines that “going from a pressure of 130 torr to [REDACTED], the operators need not change anything about the system itself,” *id.* ¶ 252, and that

“growing a diamond at [REDACTED] is no different than growing a diamond at 130 torr,” *id.* ¶ 252 (discussing insubstantial difference between a process at 130 torr and a process at [REDACTED]

93. Dr. Capano opines 2AT [REDACTED] *See id.* at ¶¶ 280–93.

RESPONSE: Disputed that IIa has accurately characterized Dr. Capano’s opinions. Dr. Capano opinions that [REDACTED] the operators need not change anything about the system itself, nor do they need to implement any new techniques to operate the system. *Id.* ¶ 281. Dr. Capano further opines that “[g]rowing diamond where the growth surface temperature [is] [REDACTED] [REDACTED] is no different than a growth surface [REDACTED] because 2A need only make minor adjustments.” *Id.* ¶ 287. Namely, to [REDACTED] the temperature [REDACTED] the operator need only [REDACTED] *Id.* Capano further opines that “[g]rowing diamonds at [REDACTED] is done the same way. The temperatures are equivalent.” *Id.* ¶ 291; *see also id.* ¶¶ 280–93.

2. Defendant’s extraterritorial conduct does not infringe the ’078 Patent

a. Plaintiffs’ Contentions

94. Plaintiffs contend that Defendants directly infringe the ’078 Patent under 35 U.S.C. §§ 271(a) and (g). Ex. 2 at 3.

RESPONSE: Undisputed that Plaintiffs contend (*inter alia*) that IIa directly infringe certain claims of the ’078 Patent under 35 U.S.C. §§ 271(a) and (g).

95. Plaintiffs contend that Defendants indirectly infringe the ’078 Patent under 35 U.S.C. §§ 271(b) and (c). *Id.*

RESPONSE: Undisputed that Plaintiffs contend (*inter alia*) that IIa indirectly infringe certain claims of the ’078 Patent under 35 U.S.C. §§ 271(b) and (c).

96. Plaintiffs contend that 2AT reduces its CVD grown diamonds' impurities and structural defects by a subsequent annealing process. Ex. 10 at ¶¶ 109.

RESPONSE: Disputed insofar as this paragraph takes Dr. Capano's statement in paragraph 109 of his report out of its context, in which he was addressing "some CVD diamond manufacturing techniques." Moffa Decl. Ex. 1, Capano Rep. ¶ 106 (emphasis added). To the extent implied by IIa's quote, Dr. Capano did not state, in paragraph 109, that 2A reduces its CVD grown diamonds' impurities and structural defects by a subsequent annealing process. Further, Exhibit 10—Dr. Capano's report—reflects Dr. Capano's testimony, not what Plaintiffs "contend."

97. Dr. Capano, in his expert report, states: "After a CVD diamond is grown and the polycrystalline material is removed, the diamond will often still have a yellow or brown color due to impurities and structural defects. CVD diamonds are often treated with high pressure and high temperature (HPHT) process, sometimes known as 'annealing,' which improves their color." Ex. 10 at ¶ 109, 365-67.

RESPONSE: Disputed insofar as this paragraph takes Dr. Capano's statement in paragraph 109 of his report out of its context, in which he was addressing "some CVD diamond manufacturing techniques." Moffa Decl. Ex. 1, Capano Rep. ¶ 106 (emphasis added). To the extent implied by IIa's quote, Dr. Capano did not state, in paragraphs 109 and 365-376 or elsewhere, that all yellow or brown diamond colors improved by annealing arise from either or both of "impurities or structural defects."

B. THE ASSERTED '078 PATENT CLAIMS ARE INVALID

1. All the asserted '078 Patent claims are invalid under 35 U.S.C. § 112 for lack of enablement and written description

98. M7D's documents describe the '078 Patent as [REDACTED]

[REDACTED] Ex. 29 at CARN-PGD_00115744.

RESPONSE: Disputed in part, but immaterial. Disputed that this proposed fact accurately quotes the cited document. It does not. See CVD. Ex. 29 at CARN-PGD_00115744. Undisputed, but immaterial,

that a Huron Capital lender presentation states at CARN-PGD_00115744 states that [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] However, there is no evidence to support that this presentation (dated 2018) was drafted by a POSA. *See generally* Ex. 29. What's more, the presentation does not support that the claims are not enabled. Rather, it simply supports that [REDACTED]

[REDACTED] *See* Ex. 29 at CARN-PGD_00115744-46.

[REDACTED] is separate and apart from the limitations of the patents-in-suit. *See* Moffa Decl. Ex. 2, Gleason '078 ¶ 81.

99. M7D's documents state that the [REDACTED]

[REDACTED] *Id.* at CARN-PGD_00115745 (emphasis in original).

RESPONSE: Undisputed, but immaterial, that a Huron Capital lending presentation so states. There is no evidence to support that this presentation (dated 2018) was drafted by a POSA. *See generally* Ex. 29. What's more, the presentation does not support that the claims are not enabled. Rather, it simply supports that [REDACTED]

[REDACTED]. *See* Ex. 29 at CARN-PGD_00115744-46. [REDACTED] is separate and apart from the limitations of the patents-in-suit. *See* Moffa Decl. Ex. 2, Gleason '078 ¶ 81. In fact, the presentation confirms that [REDACTED]

[REDACTED] which is all that is required.

100. M7D's documents state that Carnegie's patents [REDACTED]

[REDACTED]

[REDACTED]

Id.

RESPONSE: Undisputed, but immaterial, that a Huron Capital lending presentation so states. There is no evidence to support that this presentation (dated 2018) was drafted by a POSA. *See generally*

Ex. 29. What's more, the presentation does not support that the claims are not enabled. Rather, it simply supports that [REDACTED]

[REDACTED]. See Ex. 29

at CARN-PGD_00115744-46. [REDACTED] is separate and apart from the limitations of the patents-in-suit. *See* Moffa Decl. Ex. 2, Gleason '078 ¶ 81.

101. M7D's documents state, [REDACTED]

[REDACTED]" *Id.* (emphasis in original).

RESPONSE: Undisputed, but immaterial, that a Huron Capital lending presentation so states. The '078 patent does not claim, and was not required to enable or describe, [REDACTED]

[REDACTED] *See* '078 patent, claims 1 & 12. Moreover, there is no evidence to support that this presentation (dated 2018) was drafted by a POSA. *See generally* Ex. 29. What's more, the presentation does not support that the claims are not enabled. Rather, it simply supports that [REDACTED]

[REDACTED]
[REDACTED]. *See* Ex. 29 at CARN-PGD_00115744-46. [REDACTED]
[REDACTED] is separate and apart from the limitations of the patents-in-suit. *See* Moffa Decl. Ex. 2, Gleason '078 ¶ 81.

102. Dr. Yogesh K. Vohra, a named inventor of the '078 Patent, testified that one of the key innovations of the '078 Patent was control of thermal gradients "by a proper heat sink design of the substrate hold[er]." Ex. 18 at 162:6-163:1; *see also id.* at 211:24-213:19.

RESPONSE: Undisputed, but immaterial, that Dr. Vohra so stated, in part. Plaintiffs object to the proposed fact as incomplete and misleading; Dr. Vohra's complete statement should be considered. *See* Fed. R. Evid. 106. Dr. Vohra identified multiple features that were "innovative" in the '078 patent, only

one of which was “proper heat sink design of the substrate holder.” Ex. 18 at 162:6-163:1. In fact, the assert claims do not recite a particular substrate holder, and the patent identifies a variety of parameters to be considered in practicing the claimed temperature gradient limitation. ’078 patent at 6:55-65, claims 1 & 12; *see also* Moffa Decl. Ex. 2, Gleason ’078 ¶¶ 130-92.

103. Dr. Vohra testified that uniformity of temperature on the growth surface “really depends on the substrate holder design, which is critical in controlling the uniformity of temperature.” *Id.* at 129:1-19; *see also id.* at 129:8-19, 153:16-22, 154:11-18, 179:23-180:9, 189:12-190:6.

RESPONSE: Undisputed, but immaterial, that Dr. Vohra so stated, in part. Plaintiffs object to the proposed fact as incomplete and misleading; Dr. Vohra’s complete statement should be considered. *See* Fed. R. Evid. 106. Dr. Vohra testified as follows: “I think it’s a very complicated function of the heat sinking and the nth of power. So it’s really hard to make a generalized statement.” Ex. 18 at 129:11-16. In fact, the assert claims do not recite a particular substrate holder, and the patent identifies a variety of parameters to be considered in practicing the claimed temperature gradient limitation. ’078 patent at 6:55-65, claims 1 & 12; *see also* Moffa Decl. Ex. 2, Gleason ’078 ¶¶ 130-92.

104. Dr. Vohra testified that the temperature of the growth surface is not the same as the temperature gradients on the growth surface. *See id.* at 211:23-212:24.

RESPONSE: Undisputed, but immaterial.

105. Dr. Vohra testified that temperature and temperature gradient are controlled by different techniques: Temperature is controlled by adjusting the microwave power or the distance of the diamond relative to the plasma, *id.* at 213:5-10, whereas temperature gradients, are controlled by using a substrate holder that provides heat-sinking to the side surfaces of the diamond. *Id.* at 162:6-163:1, 179:23-180:9, 213:11-19

RESPONSE: Undisputed in part, but immaterial. Undisputed that Dr. Vohra so stated, in part.

While Dr. Vohra testified that a substrate holder that provides heat-sinking to the side surfaces of the diamond is one method to control temperature gradients across the growth surface, the cited testimony does not support that this was the only way to control temperature gradients, as implied in the proposed fact. In fact, the assert claims do not recite a particular substrate holder, and the patent identifies a variety of parameters to be considered in practicing the claimed temperature gradient limitation. '078 patent at 6:55-65, claims 1 & 12; *see also* Moffa Decl. Ex. 2, Gleason '078 ¶¶ 130-92.

106. The other three named inventors of the '078 patent—Drs. Russell J. Hemley, Ho-Kwang Mao, and Chih-shiue Yan-authored an article stating that “[o]ne of the critical issues in diamond synthesis employing an MPCVD reactor is the behavior of plasma-substrate and plasma-substrate holder interactions.” Ex. 30 at 3.

RESPONSE: Undisputed, but immaterial, the document so states. In fact, the assert claims do not recite a particular substrate holder, and the patent identifies a variety of parameters to be considered in practicing the claimed temperature gradient limitation. '078 patent at 6:55-65, claims 1 & 12; *see also* Gleason '078 ¶¶ 130-92.

107. Dr. Vohra testified that “it’s really a complicated, complicated thing to consider what effect different [MPCVD process] parameters have.” Ex. 18 at 42:5-20. He further testified that “it’s really a multiparameter space . . . changing one parameter can give you [a] new answer.” *Id.* at 56:1-22; *see also id.* at 214:2-21. He agreed that “if you change one thing in the system, it might affect other things.” *Id.* at 47:4-18.

RESPONSE: Undisputed, but immaterial, that Dr. Vohra so testified.

108. When asked how density of the microwave plasma affect the growth rate, Dr. Vohra testified that “I would hesitate to make a generalized statement because it’s so design specific.” *Id.* at 46:20-47:3.

RESPONSE: Undisputed, but immaterial, that Dr. Vohra so testified.

109. One of Dr. Vohra’s students remarked in a 2009 dissertation that “[a]ny small variation in growth conditions can lead to huge changes in the behavior of growth radicals in the plasma and near the substrate surface and it is nearly impossible to account for all possible changes in a theoretical explanation.” Ex. 31 at 53; Ex. 18 at 214:2-21.

RESPONSE: Undisputed that Dr. Vohra’s student so stated.

110. More than a decade after the ’078 Patent filing date, inventor Hemley acknowledged that “[t]he details [of CVD diamond growth] are still not completely understood.” Ex. 32.

RESPONSE: Undisputed, but immaterial, that Dr. Hemley so stated.

111. Carnegie and the University of Alabama (UAB) previously shared ownership the ’078 Patent. Ex. 33; Ex. 49.

RESPONSE: Undisputed, but immaterial.

112. In 2009 UAB licensed the ’078 Patent to Applied NanoCarbon. Ex. 34. Applied NanoCarbon terminated its license within a year. Ex. 35.

RESPONSE: Undisputed, but immaterial.

113. A representative from UAB stated in an email to Carnegie that Applied NanoCarbon tried to develop a commercially viable colorless gem, but failed to do so despite “sponsor[ing] this research of years” and spending “upwards of \$400K on the total development of this technology.” Ex. 36 at CARN-PGD_00227876-78.

RESPONSE: Undisputed, but immaterial. The '078 patent does not claim, and the inventors were not required to enable or describe, "a commercially viable colorless gem." *See* '078 patent, claims 1 & 12.

114. With respect to the substrate holders used in M7D's process, Yarden Tsach, M7D's Chief Technical Officer and corporate representative on technical matters, testified that [REDACTED]

[REDACTED] Ex. 28 at 82:7-84:14. He also confirmed that [REDACTED]

[REDACTED] *Id.* at

84:15-85:1. Mr. Tsach also confirmed [REDACTED]

[REDACTED] *Id.* at 212:1-7.

RESPONSE: Undisputed, but immaterial. The asserted claims of the '078 patent do not recite a particular substrate holder design. *See* '078 patent, claims 1 & 12,

115. M7D's efforts to grow a diamond continued for 4 years after its initial licensing discussions with Carnegie and 10 years after the effective date of the '078 patent. *See* Ex. 37 at CARN-FEN_00135714 (stating that "WD successfully grows its first diamond" in 2012, "WD sells its first quality stone diamond" in 2013, and WD "Continued R&D efforts to refine production process and improved yields" in 2015); Ex. 38.

RESPONSE: Disputed in part, but immaterial. According to the cited document, the Carnegie license was entered into in 2011, a diamond was first successfully grown in 2012, and a diamond was first successfully sold in 2013. *See* Ex. 37 at CARN-FEN_00135714 (stating that "WD successfully grows its first diamond" in 2012, "WD sells its first quality stone diamond" in 2013, and WD "Continued R&D efforts to refine production process and improved yields" in 2015). IIa offers no support re when "initial licensing discussions" began. *See id.* Immaterial, to the extent that the patent does not claim commercialization of diamonds. *See* '078 patent claims 1 & 12. That Plaintiffs continued research efforts toward commercialization post-patent filing is thus not relevant to any issue in this case.

2. Claims 12, 16, and 20 of '078 patent are invalid for lack of written description because the inventors did not possess the full scope of claims as written

116. Dr. Vohra, one of the named inventors of the '078 Patent, confirmed during his deposition that “below a 1000 degrees C without oxygen, [he] grew spherical black diamond-like carbon” and that it was the addition of oxygen that allowed him to reduce the growth temperature to grow diamond. Ex. 18 at 126:20-25.

RESPONSE: Disputed in part, but immaterial. Undisputed that Dr. Vohra is a named inventor on the '078 patent and that he confirmed that, with respect to the specific parameters used in Example 1, “below a 1000 degrees C without oxygen, [he] grew spherical black diamond-like carbon,” and that “when [he] added oxygen, it allowed [him] to reduce the growth temperature and still get a diamond.” Disputed to the extent the fact implies that all processes below 1000 degrees require oxygen, or that the results above would be achieved, under different overall process conditions, irrespective of temperature and oxygen alone. Moffa Decl. Ex. 2 (Gleason '078 ¶ 341).

117. When asked about Table 1 in the '078 Patent, Mr. Tsach, M7D’s CTO and corporate representative on technical matters, testified, “I think that what the description is teaching is that both the gas chemistry and the temperature needs to be maintained in certain ranges in order to achieve a diamond growth.” Ex. 28 at 191:3-192:12.

RESPONSE: Undisputed, but immaterial, that Mr. Tsach so stated, in part. Plaintiffs object to the proposed fact as incomplete and misleading; Mr. Tsach’s complete statement should be considered. *See Fed. R. Evid. 106.* The complete question and answer is as follows:

Q. So then you would agree with me that the temperature range, for example, depends on the gas chemistry?

A. I don’t think that the temperature range depends on the gas chemistry. I think that what the description is teaching is that both the gas chemistry and the

temperature needs to be maintained in certain ranges in order to achieve a diamond growth.

Ex. 28 (Tsach Dep. at 192:3-12). Mr. Tsach thus made clear that temperature range does *not* depend on gas chemistry. *See id.*

III. THE '189 PATENT

118. U.S. Reissue Patent RE41,189 (“the ’189 Patent”) issued on April 6, 2010, and reissued from U.S. Patent No. 6,811,610 (“the ’610 Patent”). Ex. 39. The ’189 Patent is titled “Method of Making Enhanced CVD Diamond,” and names Drs. Wei Li, Russell J. Hemley, Ho-kwang Mao, and Chih-shieh Yan as inventors. U.S. Application No. 10/161,266, which issued as the ’610 Patent, was filed on June 3, 2002. *Id.*

RESPONSE: Undisputed.

119. Plaintiffs assert that 2AT’s annealing process infringes claims 1 and 2 of the ’189 Patent. Ex. 2 at 3; Ex. 10 at ¶¶ 365-66.

RESPONSE: Undisputed.

120. The asserted claims of the ’189 Patent recite;

1. A method to improve the optical clarity of CVD diamond where the CVD diamond is single crystal CVD diamond, by raising the CVD diamond to a set temperature of at least 1500° C. and a pressure of at least 4.0 GPA outside of the diamond stable phase.
2. The method of claim 1 wherein the CVD diamond is a single crystal coating upon another material.

Ex. 39 at 4:10-16.

RESPONSE: Undisputed.

121. Plaintiffs specifically contend that 2AT’s annealing process improves the optical clarity of the annealed diamond as recited in the preamble limitation of claim 1 of the ’189 patent. Ex. 2 at 3; Ex. 10 ¶ 367.

RESPONSE: Disputed. Plaintiffs object to this paragraph as vague as it appears to refer to annealing an already-annealed diamond to improve its optical quality. As best understood, this paragraph mischaracterizes evidence. Exhibit 10—Dr. Capano’s report—reflects Dr. Capano’s testimony, not what Plaintiffs “contend.” Further, neither page 3 of Exhibit 2—Plaintiffs’ Second Amended Infringement Contentions—nor paragraph 367 of Dr. Capano’s report contends that 2A’s annealing process “improves the optical clarity of [an] annealed diamond.” *See* Ex. 2 at 3, Ex. 10 ¶ 367.

122. The ’189 Patent states:

It would be advantageous if a method were devised that would significantly improve the properties of CVD diamond after it is grown. It would also be desirable to form CVD diamond with fewer defects that serve to degrade the intrinsic properties of a perfect crystalline diamond material in order to enhance its usage in many applications.

Id. at 1:44-49.

RESPONSE: Undisputed that IIa has accurately quoted a portion of the ’189 patent. To the extent IIa is proposing as a fact any of the statements contained in the quoted portion (which is not clear from IIa’s paragraph), disputed on the grounds that Plaintiffs cannot discern what factual proposition(s) IIa is attempting to support.

123. The ’189 patent states that “treating CVD diamond at high pressure and high temperature (HPHT) causes the optical properties to change so much that opaque material become clear.” *Id.* at 2:29-32.

RESPONSE: Undisputed that IIa has accurately quoted a portion of the ’189 patent. To the extent IIa is proposing as a fact any of the statements contained in the quoted portion (which is not clear from IIa’s paragraph), disputed on the grounds that Plaintiffs cannot discern what factual proposition(s) IIa is attempting to support.

124. The ’189 Patent states:

Possibly, internal atoms shift position to more correctly align themselves to the diamond crystalline structure or perhaps the bonding mechanism shifts such that SP₂ type bonds become SP³ type bonds causing carbon atoms to change from impurity status to becoming part of the diamond crystal lattice.

Id. at 2:23-28.

RESPONSE: Undisputed that IIa has accurately quoted a portion of the '189 patent, other than "SP₂," which should read "SP²" (with superscript). To the extent that IIa is proposing as a fact any of the statements contained in the quoted portion (which is not clear from IIa's paragraph), disputed on the grounds that Plaintiffs cannot discern what factual proposition(s) IIa is attempting to support.

125. The '189 Patent states:

It would be advantageous if a method were devised that would significantly improve the properties of CVD diamond after it is grown. It would also be desirable to form CVD diamond with fewer defects that serve to degrade the intrinsic properties of a perfect crystalline diamond material in order to enhance its usage in many applications.

Ex. 39 at 1:44-49.

RESPONSE: Undisputed that IIa has accurately quoted a portion of the '189 Patent. To the extent that IIa is proposing as a fact any of the statements contained in the quoted portion (which is not clear from IIa's paragraph), disputed on the grounds that Plaintiffs cannot discern what factual proposition(s) IIa is attempting to support.

126. High Pressure/High Temperature ("HPHT") annealing can alter a diamond's atomic and chemical structure and its physical properties. Ex. 40 at ¶¶ 47-94; *see* Ex. 1 at 14:40- 42; Ex. 39 at 2:23-32; Ex. 41 at RF61, RF70; Ex. 42 at 44:7-46:19, 64:1-69:7, 119:21-120:13, 139:16-140:19; Ex. 43 at 1:25-32, 1:51-53, 4:4-13, 7:51-57; Ex. 44 at 1193; Ex. 45 at 189; Ex. 46 at 42.

RESPONSE: Undisputed that the annealing methods claimed in the '189 patent improve the optical clarity of a single crystal CVD diamond but disputed that the annealing methods materially changes the treated diamond, as Dr. De Weerdt opines in the cited paragraphs from his report (Ex. 40). Disputed

that the cited portions of the listed documents (the '078 patent, the '189 patent, [REDACTED]

[REDACTED] Robert Frushour's deposition testimony, Patent No. 5,672,395, *DeVries, Schmetzer, Overton & Shigley*) support the alleged fact.

127. Dr. Frushour, one of the named inventors on the patent that reissued as the '189 Patent, testified [REDACTED] Ex. 41 at RF61, RF70; Ex. 42 at 44:7-46:19, 64:1-69:7, 119:21-120:13, 139:16-140:19.

RESPONSE: Disputed insofar as this passage does not accurately reflect testimony of Dr. Frushour. Plaintiffs object to the term [REDACTED] as vague. Dr. Frushour in fact testified only that,

[REDACTED]
[REDACTED]
[REDACTED] Ex. 42 at 45:6-46:14 (emphasis added). Further disputed insofar as

[REDACTED] statements by Dr. Frushour at [REDACTED]
[REDACTED]

128. Defendants' expert Dr. De Weerdt provided an opinion that scientific literature supports a finding that annealing significantly changes a diamonds' atomic structure and physical properties. See Ex. 40 at ¶¶ 82-84.

RESPONSE: Plaintiffs object to the inclusion of statements from a *rebuttal* report by *Ha*'s expert as factual support for a motion on which factual disputes are resolved in Plaintiffs' favor. Plaintiffs object to the terms "annealing," "significantly changes," "atomic structure," and "physical properties" each as vague. Plaintiffs dispute the factual submission of paragraph 128 that "annealing," without limitation, "significantly changes a diamonds' atomic structure and physical properties." Plaintiffs further dispute that the cited paragraphs of Dr. De Weerdt's report supports the submission of paragraph 128 insofar as (1) Dr.

De Weerdt's statements refer only to what "has been shown in the literature," and (2) Dr. De Weerdt describes such showing as only "improving the properties of . . . diamond parts . . ." Ex. 40 ¶ 82.

[Unnumbered Proposed Fact] The report of Plaintiffs' expert Dr. Capano states that "The [’189 patent] inventors described an example in which they treated CVD diamond and as a result, 'opaque CVD diamond layer turned clear.'" Ex. 10 ¶ 356.

RESPONSE: Undisputed.

129. Claims 1 and 2 of the ’189 Patent do not provide a definition for the diamond- graphite boundary. Ex. 39 at claims 1 and 2.

RESPONSE: Plaintiffs object to this proposed fact as vague, in particular as to the term "provide a definition." Undisputed that claims 1 and 2 of the ’189 patent do not expressly define the term "outside the diamond stable phase," but immaterial. Plaintiffs dispute that any such definition was necessary to render claims 1 and 2 valid. A person of ordinary skill in the art ("POSA") would understand the meaning of the claim term "outside the diamond stable phase," and thus the scope of the claims, with reasonable certainty.

See Moffa Decl. Ex. 3, Gleason ’189 ¶¶ 210-213.

130. The specification of the ’189 Patent does not provide a definition for the diamond-graphite boundary. Ex. 39.

RESPONSE: Plaintiffs object to this proposed fact as vague, in particular as to the term "provide a definition." Disputed that the ’189 patent fails to convey to skilled artisans the meaning of "outside the diamond stable phase," even if the specification does not incorporate by reference a particular diamond-phase boundary from published literature. Plaintiffs dispute that any such adoption or incorporation by reference was necessary to render claims 1 and 2 valid. A POSA would understand the meaning of the claim term "outside the diamond stable phase," and thus the scope of the claims, with reasonable certainty.

See Moffa Decl. Ex. 3, Gleason ’189 ¶¶ 210-213.

131. The specification of the '189 Patent mentions operating “where graphite is the stable phase” and “within the graphite stable region.” *Id.* at 2:41-50. Specifically, the '189 Patent states:

Thus, one would expect that when diamond is heated to temperatures above 850° C., at pressures where graphite is the stable phase, significant degradation of the sample would result. However, very unexpected behavior occurs in CVD diamond at high temperatures where the pressure is raised above atmospheric pressure but still remains within the graphite stable region. Under certain conditions of temperature and pressure, CVD diamond does not degrade; instead the opposite occurs: the sample is transformed into a more perfect diamond crystalline material.

Id. at 2:41-50.

RESPONSE: Undisputed that IIa has accurately quoted a portion of the '189 patent. To the extent that IIa is proposing as a fact any of the statements contained in the quoted portion (which is not clear from IIa's paragraph), disputed on the grounds that Plaintiffs cannot discern what factual proposition(s) IIa is attempting to support.

132. The Applicant's remarks during the prosecution history of the '189 Patent do not provide a definition for the diamond-graphite boundary. *See generally* Ex. 47.

RESPONSE: Plaintiffs object to this proposed fact as vague, in particular as to the term “provide a definition.” Disputed. The applicants for the '189 patent explained that:

Applicant's invention improves the optical clarity of the single crystal CVD diamond by subjecting the CVD diamond to temperature and pressure which nominally place the diamond sample out of the diamond stable phase and into the graphite stable stage where the diamond could back convert to graphite. However, the pressures, temperatures, and treatment times used by the Applicant prevent any back conversion, while at the same time improving the optical clarity of the single crystal CVD diamond.

Ex. 47 at Carnegie_189_Defendants-00008011-12 (emphasis added). These statements convey the claimed conditions to POSA, including that the requirement of process parameters “outside of the diamond stable phase,” and convey any understanding of the diamond-graphite boundary needed to understand the claim scope. Plaintiffs further dispute that the applicants were required to provide to the PTO an explicit

definition of the diamond-phase boundary such as, for example, a particular phase diagram from published literature, to render claims 1 and 2 valid. A POSA would understand the meaning of the claim term “outside the diamond stable phase,” and thus the scope of the claims, with reasonable certainty. *See* Moffa Decl. Ex. 3, Gleason '189 ¶¶ 210-13.

133. As of June 3, 2002, at least the following four references provided different definitions for the diamond-graphite boundary:

Reference
Ex. 49, F.P. Bundy et al., <i>The Pressure-Temperature Phase and Transformation Diagram for Carbon</i> ; Updated Through 1994, 34 CARBON 141, 142 (1996) (“Bundy”)
Ex. 50, U.S. Patent No. 4,124,690 (1978) at Fig. 1 (“Strong”)
Ex. 51, C.S. Kennedy & G.C. Kennedy, <i>The Equilibrium Boundary Between Graphite and Diamond</i> , 81 JOURNAL OF GEOPHYSICAL RESEARCH 2467, 2467 (1976) (“Kennedy & Kennedy”)
Ex. 52, R. Berman & Sir F. Simon, <i>On the Graphite – Diamond Equilibrium</i> , 59 Zeitschrift für Elektrochemie, Berichte der Bunsengesellschaft für physikalische Chemie 333, 338 (1955) (“Berman & Simon”)

Ex. 10 at ¶ 382.

RESPONSE: Disputed that these references provide a differing “definition” for the diamond-graphite boundary, as that boundary is defined by thermodynamic principles. *See, e.g.*, Ex. 52 at CARN-PGD_00163519 (“Before the enunciation of the Third Law of Thermodynamics there was no means of predicting the equilibrium curve, but from geological evidence it appeared that diamond was formed under conditions of high temperature and high pressure.”). Undisputed that each of the listed reference provides an experimental estimate for the conditions at which the boundary exists based on data generated or reviewed by the authors. To the extent IIa implies that other references provided similar estimates prior to

June 3, 2002, disputed on the grounds that Plaintiffs cannot discern what additional references IIa claims provide the information.

134. Plaintiffs' corporate witnesses, inventor Russell J. Hemley, and Plaintiffs' technical expert Dr. Capano all acknowledge the lack of a clear metric for assessing the boundary between the graphite-stable and diamond-stable regions of the carbon phase diagram. Ex. 28 at 227:7-228:1; Ex. 53 at 205:17-208:19; Ex. 4 at 166:5-168:24.

RESPONSE: Disputed that a clear metric for assessing the boundary between the graphite-stable and diamond-stable regions of the carbon phase diagram was lacking at the time of the '189 patent application, or any time thereafter. The carbon phase diagram was the subject of several scientific studies, *See* Moffa Decl. Ex. 3, Gleason '189 ¶¶ 210-11; Ex. 10, Capano Rep. ¶¶ 380-84; *Berman-Simon* (Ex. 52); *Bundy* (Ex. 49); Moffa Decl. Ex. 10, *Vagarli* (Carnegie_189_Defendants-00000815-0823); Moffa Decl. Ex. 11, *Strong* 380 (Carnegie_189_Defendants-00000695-706); Day (Ex 54); *Kennedy & Kennedy* (Ex. 51); *Strong* 690 (Ex. 50A). A POSA would review the robust body of literature to gain the necessary understanding of the boundary, Ex. 10 ¶¶ 381-82 presenting "delineation line between graphite and diamond stable phase" based on 6 references); Moffa Decl. Ex. 3, Gleason Rep. 189 ¶ 211 ("the carbon phase diagram had been published by several researchers. . . A skilled artisan would survey the available literature and make a well-informed determination of the phase boundary and would ascertain within the uncertainty permitted in chemistry whether a particular condition was inside or outside the diamond-stable phase."). Further disputed that the cited testimony from Mr. Yarden Tsach, Dr. Russel Hemley, or Dr. Michael Walter supports the stated fact. In the cited testimony, Mr. Tsach just recognized the differing description of the carbon phase diagram from different people, Ex. 28 227:13-20; Dr. Hemley merely acknowledged the phase boundary definition in his 1996 publication, Ex. 4, 168:3-24; and Dr. Walter recognized the published phase diagrams, but explained that they were "all pretty close to each other," the

boundary lines “might shift from publication to publication to some slight degree,” and the characterization “has changed to some degree, but not significantly,” Ex. 53 at 205:8-208:19. Also, on the grounds that Plaintiffs cannot discern what testimony from Dr. Capano IIa relies on for this fact because nothing from Dr. Capano is cited, Plaintiffs disputed that Dr. Capano acknowledged the lack of a supposedly clear metric assessing the boundary between the graphite-stable and diamond-stable regions of the carbon phase diagram.

135. *Bundy* provides a definition for the diamond-graphite boundary as follows:

The topology of stability fields of the thermodynamically stable phases is quite simple: (i) the boundary between the graphite and diamond stable regions which runs from 1.7 GPa/0 K, to the graphite/diamond/liquid triple point at about 12 GPa/5000K

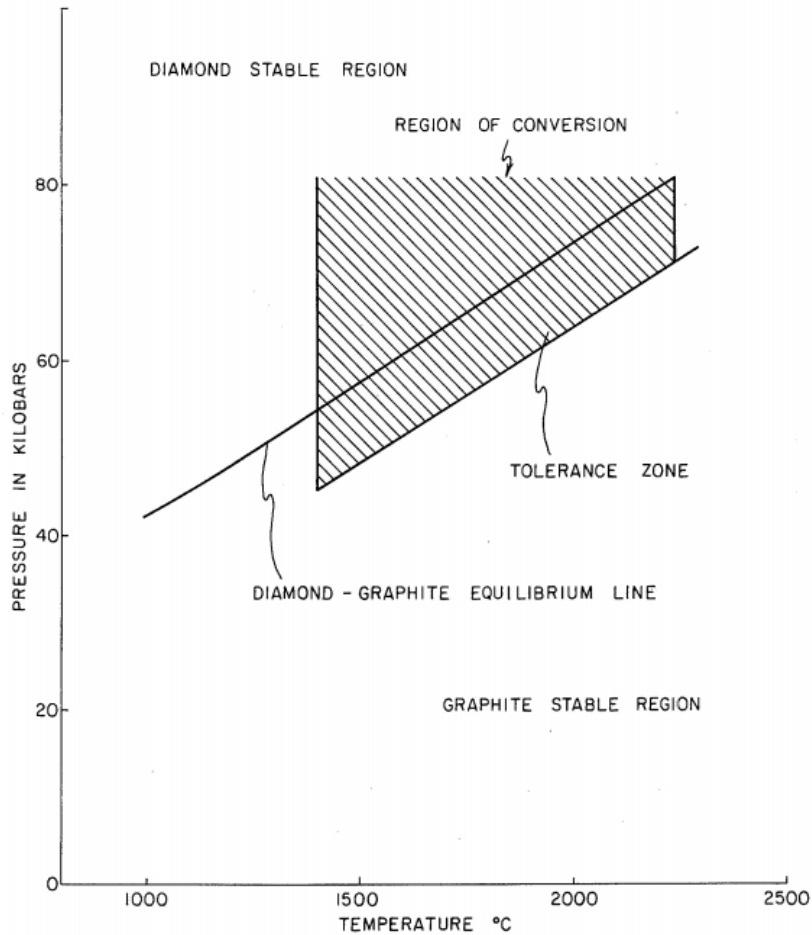
Ex. 49 at 2; *see also* Ex. 4 at 168:3-23.

RESPONSE: Disputed that, in the cited portion, *Bundy* defines the diamond-graphite boundary because that boundary is defined by thermodynamic principles. *See, e.g.*, Ex. 52 at CARN-PGD_00163519 (“Before the enunciation of the Third Law of Thermodynamics there was no means of predicting the equilibrium curve, but from geological evidence it appeared that diamond was formed under conditions of high temperature and high pressure.”). Undisputed that, in the cited excerpt, *Bundy* discusses an estimate for the boundary between the graphite and diamond stable regions. Disputed that the cited testimony from Dr. Hemley supports the notion that the phase boundary is defined by thermodynamic principles.¹³⁶.

Two of the co-authors of *Bundy*, Drs. Russell J. Hemley and Ho-kwang Mao, are named as inventors of the ’189 Patent. *See* Ex. 49 at 141; Ex. 39.

RESPONSE: Undisputed.

137. *Strong* provides a graphical plot of the diamond-graphite boundary as shown in the figure below:



Ex. 50 at Fig. 1.

RESPONSE: Undisputed that IIa has accurately reproduced Fig. 1 of U.S. Patent No. 4,124,690, which is Ex. 5. To the extent that IIa is proposing as a fact any of the information portrayed in Fig. 1, (which is not clear from IIa's paragraph), disputed on the grounds that Plaintiffs cannot discern what factual information IIa is attempting to support.

138. *Kennedy & Kennedy* provides a definition for the diamond-graphite boundary as follows:

Our newly determined boundary has the equation $P(\text{kbar}) = 19.4 + T (\text{°C})/40$ kbar.

Ex. 51 at 2467.

RESPONSE: Disputed that, in the cited portion, *Kennedy & Kennedy* defines the diamond-graphite boundary because that boundary is defined by thermodynamic principles. *See, e.g.*, Ex. 52 at CARN-PGD_00163519 (“Before the enunciation of the Third Law of Thermodynamics there was no means of predicting the equilibrium curve, but from geological evidence it appeared that diamond was formed under conditions of high temperature and high pressure.”). Undisputed that, in the cited excerpt, *Kennedy & Kennedy* provides their belief, that is, their estimate for the boundary between the graphite and diamond stable regions. *See* Ex. 51 at 2469 (“We believe the position and slope of the boundary to be of high precision.”).

139. *Berman & Simon* provides a definition for the diamond-graphite boundary as follows:

It may be useful to give an equation for the equilibrium pressure above 12000 ° K. This is: –

$$P_{ats} = 7000 + 27T \text{ (°K)} \quad T > 1200 \text{ °K}$$

Ex. 52 at 338.

RESPONSE: Disputed that, in the cited portion, *Berman & Simon* defines the diamond-graphite boundary because that boundary is defined by thermodynamic principles. *See, e.g.*, Ex. 52 at CARN-PGD_00163519 (“Before the enunciation of the Third Law of Thermodynamics there was no means of predicting the equilibrium curve, but from geological evidence it appeared that diamond was formed under conditions of high temperature and high pressure.”). Undisputed that, in the cited excerpt, *Berman & Simon* provided their extrapolation for the equilibrium curve between graphite and diamond based on “some new experimental data,” recognizing its possible inaccuracy. *See* Ex. 52 at 333 (“The equilibrium pressures below 1200° are shown in a table, while above 1200° K the curve can be represented by the equation $P_{ats} = 7000 + 27T \text{ (°K)}$, which should be accurate to within about 5 % .”).

IV. THE 189 PATENT IS INVALID OR ALTERNATIVELY, NOT INFRINGED

A. THE ASSERTED '189 PATENT CLAIMS ARE INVALID AS INDEFINITE

140. Howard W. Day, *A Revised Diamond-Graphite Transition Curve*, 97 AMERICAN MINERALOGIST 52-62 (2012) ("Day") published in 2012. Ex. 54.

RESPONSE: Plaintiffs object to this fact as representing a legal conclusion about the publication date of a scientific paper. Disputed on the grounds that Plaintiffs cannot evaluate IIa's basis for alleging a particular publication date.

141. Dr. Capano provides an opinion that the proper definition of the diamond-graphite boundary is called the "G&K corrected line," appearing in *Day*. Ex. 10 at ¶ 383. Specifically, Dr. Capano states:

Based on my understanding of the references I have reviewed, I believe that the Day G&K corrected line is indicative of the appropriate understanding of the accepted delineation between the graphite and diamond stable phase. This paper was written in 2012 and considers and analyzes many of the other references I included above, including Berman-Simon, Bundy, and papers by Strong (see References). Because this appears to be, in my view the most comprehensive analysis of the transition between the graphite and diamond stable phases of carbon, I use the Day G&K for my infringement analysis.

Id.

RESPONSE: Plaintiffs object to this proposed fact as vague, in particular as to the term "the proper definition" and "'is called.'" Undisputed that IIa has accurately quoted a portion of Dr. Capano's report.

142. *Day* provides a definition for the "G&K corrected line" as follows:

The corrected experiments are approximately described by the equation (Table 1)

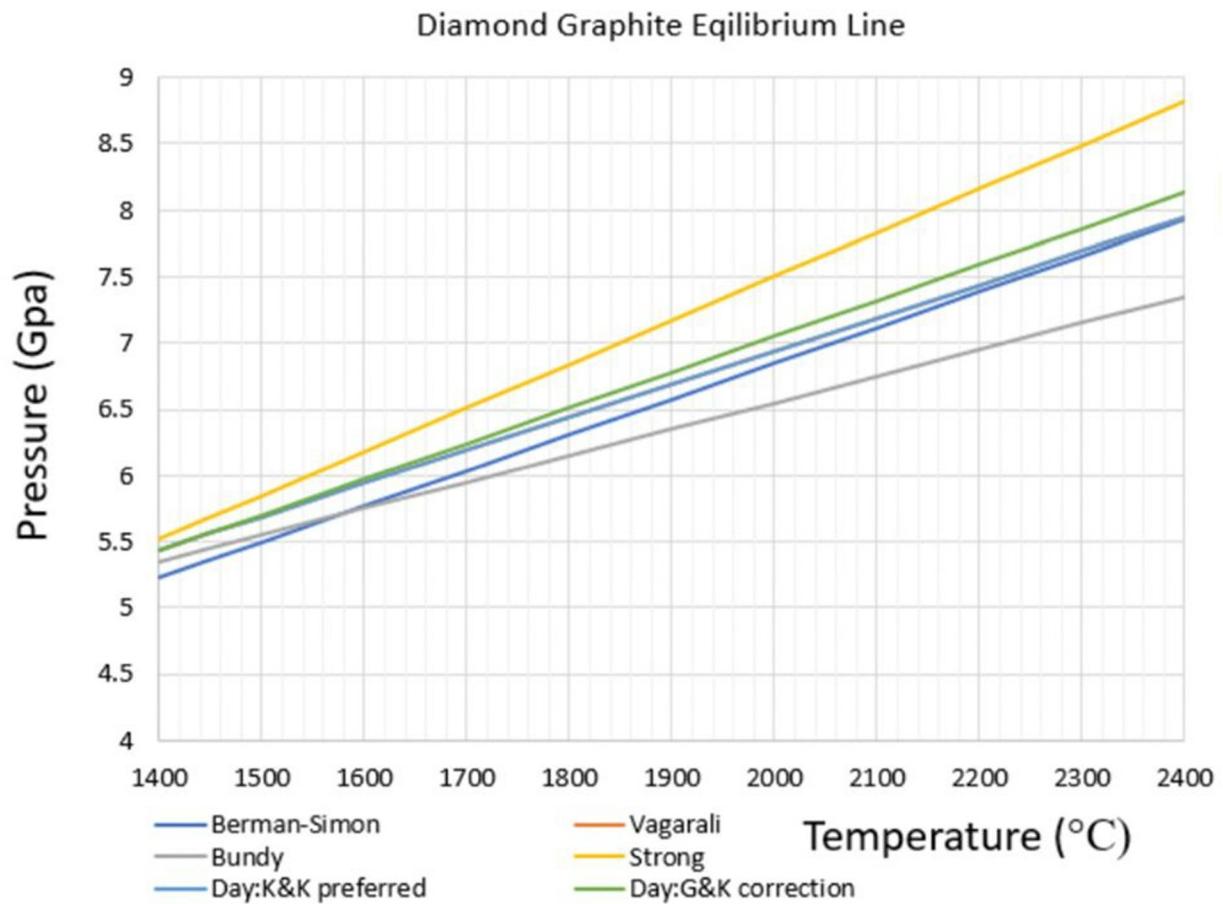
$$P \text{ (kbar)} = 16.5 + 0.027T_{GK} \text{ (°C)}$$

Ex. 54 at 54.

RESPONSE: Plaintiffs object to this proposed fact as vague, in particular as to the term "provides a definition." Disputed that, in the cited portion, *Day* defines the diamond-graphite boundary because that

boundary is defined by thermodynamic principles. *See, e.g.*, Ex. 52 at CARN-PGD_00163519 (“Before the enunciation of the Third Law of Thermodynamics there was no means of predicting the equilibrium curve, but from geological evidence it appeared that diamond was formed under conditions of high temperature and high pressure.”). Undisputed that, in the cited excerpt, *Day* provided an equation estimating the diamond-graphite equilibrium line from data previously published by *Kennedy & Kennedy* and *Getting & Kennedy*. *See* Ex. 54 at 54. *Day* recognized the uncertainties of the estimate: “Two experiments lie on this curve, and the curve misses one bracket by about 0.2 kbar, within the combined uncertainties of temperature and pressure. Clearly, there are uncertainties in the best reconstruction of the experimental data of Kennedy and Kennedy (1976) that might lead to the discrepancies between the experiments and the calculated transition.” *Id* at 54-55.

143. Dr. Capano agrees that the definitions of the diamond-graphite boundary provided in *Day*, *Bundy, Kennedy & Kennedy, Strong*, and *Berman & Simon* differ. Ex. 10 at ¶¶ 383-84. Dr. Capano provides the illustration below and states:

Plot B

The above Plot B shows that the understanding of the delineation line has changed as scientific understandings of the complex thermal interactions that take place in carbon structures has grown.

Ex. 10 ¶¶ 383-84.

RESPONSE: Plaintiffs object to this proposed fact as vague, in particular as to the terms “the definitions” and “differ.” Disputed that the listed papers define the diamond-graphite boundary because that boundary is defined by thermodynamic principles. *See, e.g.,* Ex. 52 at CARN-PGD_00163519 (“Before the enunciation of the Third Law of Thermodynamics there was no means of predicting the equilibrium curve, but from geological evidence it appeared that diamond was formed under conditions of

high temperature and high pressure.”). Undisputed that IIa has accurately reproduced Plot B from Dr. Capano’s report. To the extent IIa alleges that this plot support the notion of “differing” definitions of the diamond-graphite boundary, Plaintiffs dispute that any such differences in the definition exist.

144. Dr. Capano recognizes that these differing definitions for the diamond-graphite boundary make a difference with respect to whether 2AT practices the asserted claims the ’189 Patent. Dr. Capano opines that 2AT practices the asserted claims of the ’189 Patent under the definitions of *Day* and *Strong*. Dr. Capano admits 2AT does not practice the asserted claims of the ’189 Patent under the [REDACTED] definition Ex. 10 at ¶¶ 385-391, 392, 398.

RESPONSE: Plaintiffs object to this proposed fact as vague, in particular as to the terms “differing definitions,” “make a difference,” “definitions,” and “definition.” Disputed that Dr. Capano based his infringement analysis on the information from only a single prior art reference. He considered the full body of scientific literature available. Moffa Decl. Ex. 1, Capano Rep. ¶¶ 381-98.

B. THE ASSERTED ’189 PATENT CLAIMS ARE NOT INFRINGED

145. [REDACTED]

[REDACTED] Ex. 40 at ¶¶ 89-93.

RESPONSE: Plaintiffs object to the proposed finding of fact as vague, in particular as to the phrases [REDACTED]

[REDACTED] Plaintiffs further object to the proposed finding of fact as calling for information outside of Plaintiffs’ possession, custody, or control, as Plaintiffs have no way of knowing what [REDACTED]

[REDACTED] Subject to Plaintiffs’ objections, undisputed that [REDACTED]

[REDACTED]
[REDACTED] Otherwise, immaterial whether the [REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
146. 2AT has produced over [REDACTED]

[REDACTED] For each [REDACTED]

[REDACTED]⁸ See also

Ex. 7 at 236:2-240:10.

RESPONSE: Undisputed that IIa produced [REDACTED]

[REDACTED]. To the extent IIa alleges that the produced documents show 2A does not practice the patented annealing methods, disputed because, among other things, [REDACTED]

[REDACTED]
Further disputed because Plaintiffs have adduced evidence that 2A practices the patented annealing methods. *See* Moffa Decl. Ex. 1, Capano Rep. ¶¶ 365-404; Moffa Decl. Ex. 7, Misra Dep. 25:16-26:7; 44:8-46:25; 47:21-50:23; 118: 6-17; 144:14-146:1; 151:18-20; 203:13-249:4; *See, e.g.*, Moffa Decl. Ex. 12, Carnegie_189_2AT-00126992; Moffa Decl. Ex. 13, Carnegie_189_2AT_00000557-576 (Luoyang Manual); Ex. 14, Carnegie_189_2AT_00126977-991 (Guilin Guiye CS-XII Manual); Moffa Decl. Ex. 15, Carnegie_189_2AT_00126956-976 (Guiye CS-XIII Manual - in Chinese).

147. [REDACTED]

[REDACTED]⁹ *See* Ex. 7 at 239:2-242:10; Ex. 57 at ¶¶ 53- 55.

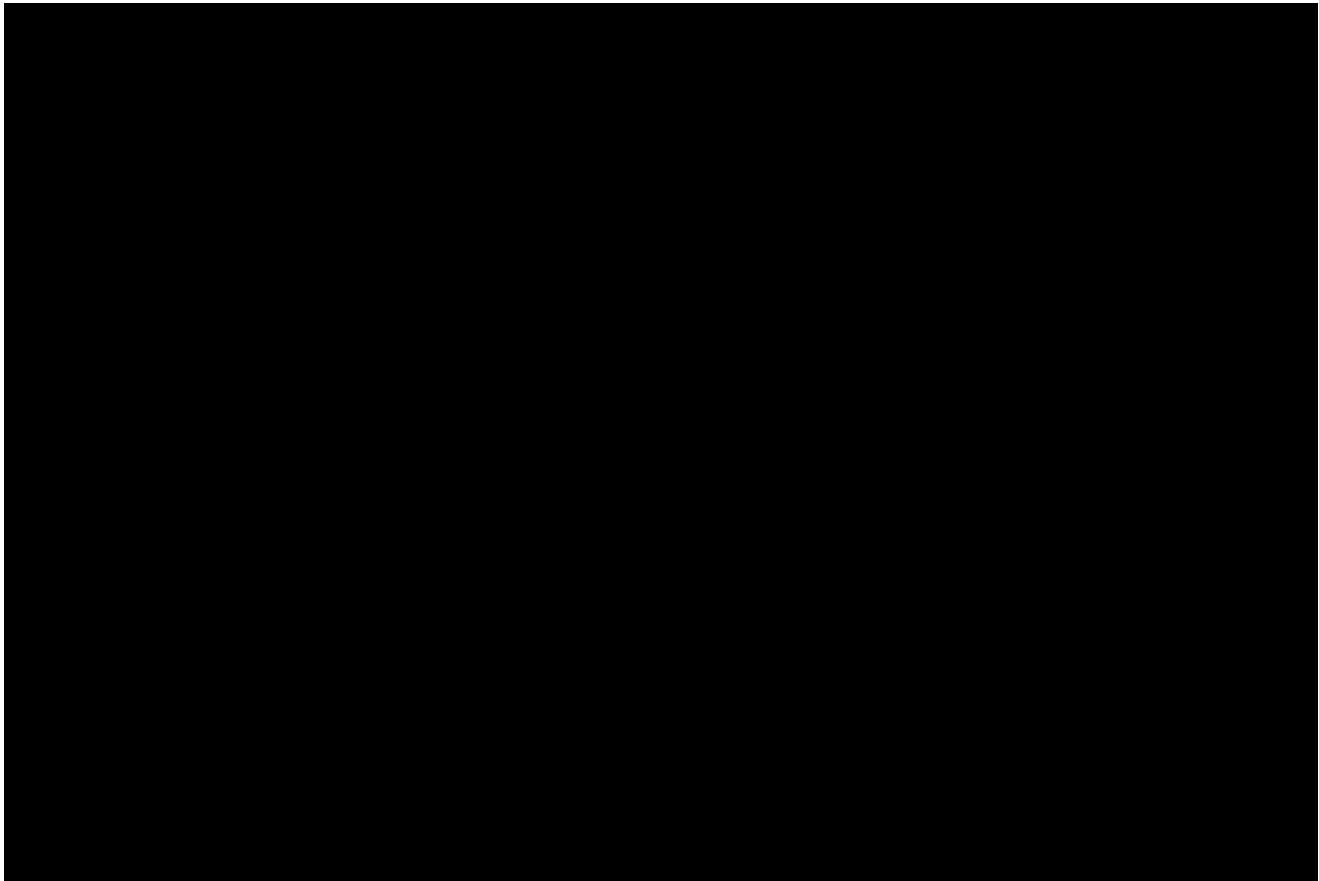
⁸ These [REDACTED] are voluminous but can be made available at the Court's request. PDF versions of the reports are located at Carnegie_189_2AT-00126324-6917; Carnegie_189_2AT-00122022-3129; Carnegie_189_2AT-00124071-5432; Carnegie_189_2AT- 00125433-6323; Carnegie_189_2AT-00123130-4070; Carnegie_189_2AT-00121903-2021. An Excel spreadsheet containing [REDACTED] is located at Exhibit 10 of the Rebuttal Expert Report of Dr. De Weerdt Regarding the Non-Infringement of Claims 1 and 2 of U.S. Patent No. RE41,189.

⁹ IIa uses [REDACTED] This spreadsheet can be made available at the Court's request and is located at Carnegie_189_2AT_00126992.

RESPONSE: Undisputed that 2A produced [REDACTED]

[REDACTED] To the extent IIa alleges that the produced documents show 2A does not practice the patented annealing methods, or that the data can be converted to reflect temperatures and pressures, disputed because, among other things, [REDACTED]
[REDACTED]
[REDACTED] Further disputed because Plaintiffs have adduced evidence that 2A practices the patented annealing methods. *See* Moffa Decl. Ex. 1, Capano Rep. ¶¶ 365-404; Moffa Decl. Ex. 7, Misra Dep. 25:16-26:7; 44:8-46:25; 47:21-50:23; 118: 6-17; 144:14-146:1; 151:18-20; 203:13-249:4; *See, e.g.*, Moffa Decl. Ex. 12, Carnegie_189_2AT-00126992; Moffa Decl. Ex. 13, Carnegie_189_2AT_00000557-576 (Luoyang Manual); Ex. 14, Carnegie_189_2AT_00126977-991 (Guilin Guiye CS-XII Manual); Moffa Decl. Ex. 15, Carnegie_189_2AT_00126956-976 (Guiye CS-XIII Manual - in Chinese);

.
148. Defendants' expert Dr. De Weerdt analyzed 2AT's [REDACTED]. Ex. 57 at ¶ 64-79. He also examined the testimony of 2AT's witnesses. *Id.* at ¶ 38-57, 69-70. Dr. De Weerdt found the data and testimony to be consistent. *Id.* at ¶ 59. Dr. De Weerdt prepared [REDACTED]
[REDACTED]



RESPONSE: Undisputed that Dr. De Weerdt purports to have analyzed 2A's [REDACTED]

[REDACTED] but disputed that all the cited paragraphs of his report (Ex. 57 ¶¶ 64-79) pertain to this analysis and thus that they support the first sentence of ¶ 148. To the extent IIa alleges that the produced documents show 2A does not practice the patented annealing methods, or that the data can be converted to reflect temperatures and pressures, disputed because, among other things, [REDACTED]

[REDACTED]
[REDACTED] Undisputed but immaterial that Dr De Weerdt cited portions of 2A witness testimony in his report regarding infringement. As Dr. Capano explained, the witness testimony confirms that 2A infringes the '189 patent. *See, e.g.*, Moffa Decl. Ex.1, Capano Rep. ¶¶ 366-67, 370-71, 373-78, 392, 403-04, 407. Disputed and immaterial that Dr. De Weerdt found the witness testimony and run data to be consistent, or that Ex. 57 ¶ 59 supports that assertion. Undisputed that IIa has accurately reproduced the figure above from ¶ 72 of Dr. De Weerdt's report but disputed that the

figure “visually summarize[s] all of the [REDACTED]

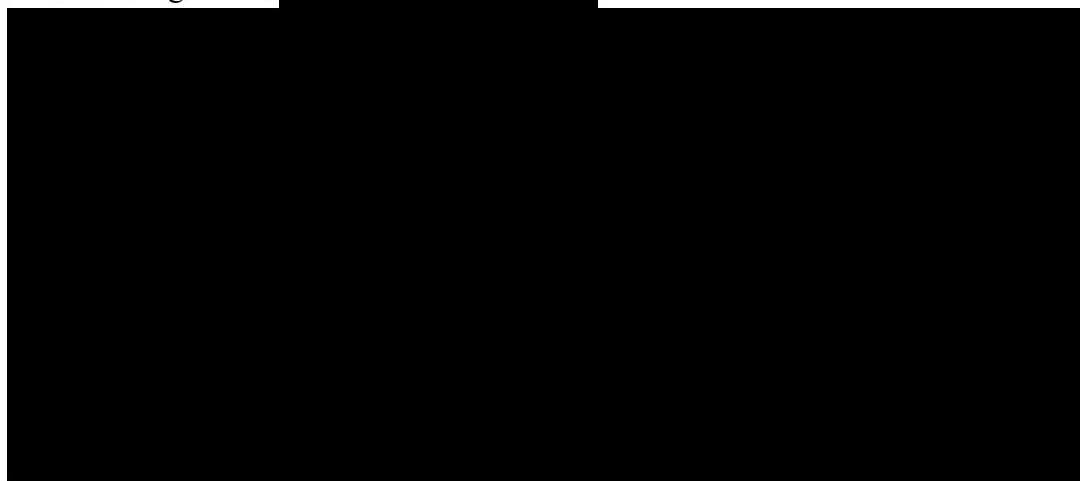
[REDACTED]
[REDACTED]
[REDACTED] See Ex. 57 ¶ 72 (“I

[REDACTED] To the extent IIa is proposing as a fact any of the data or information contained in the figure above (which is not clear from IIa’s paragraph), disputed on the grounds that Plaintiffs cannot discern what factual proposition(s) IIa is attempting to support.

149. Color and clarity are two of the “4 Cs” that drive consumer purchases of jewelry. Ex. 10 at ¶¶ 110-20, 351.

RESPONSE: Undisputed but immaterial that color and clarity are two of the “4 Cs” on which diamonds are rated. Disputed that color or clarity necessarily drive consumer purchases of jewelry. *See Ex. 10 ¶ 119* (indicating that consumers “might ask for a diamond that is one carat or above, with a cut of good or better, a color of H or better, and a clarity of SI2 or better.”). To the extent IIa is proposing that color or clarity drive consumer purchases more than other factors, disputed on the grounds that Plaintiffs cannot discern what specific fact IIa alleges.

150. The following images show an example of the color and clarity of a diamond before and after it was annealed using 2AT’s [REDACTED] :



Ex. 40 at ¶ 90.

RESPONSE: Disputed. The cited evidence does not support this proposed fact. Undisputed that Ex. 40 ¶ 90 includes the images above and that Dr. De Weerdt alleges these [REDACTED]

[REDACTED] But disputed because Plaintiffs have no way to assess the accuracy of this statement—[REDACTED]

[REDACTED] The images themselves and Dr. De Weerdt's report (Ex. 40) contains no information from which to deduce this proposed fact. Plaintiffs object to the proposed fact as calling for information outside of Plaintiffs' possession, custody, or control. Plaintiffs further object to the extent that color and clarity cannot be reliably ascertained from the images above because the procedure used to capture these images is unknown.

151. [REDACTED]

RESPONSE: Disputed because, among other things, [REDACTED]

[REDACTED]
[REDACTED] Further disputed that *Bundy* defines the diamond-graphite boundary because that boundary is defined by thermodynamic principles. *See, e.g.*, Ex. 52 at CARN-PGD_00163519 (“Before the enunciation of the Third Law of Thermodynamics there was no means of predicting the equilibrium curve, but from geological evidence it appeared that diamond was formed under conditions of high temperature and high pressure.”). To the extent IIa proposes that [REDACTED] supports 2A's supposed non-infringement, disputed. The carbon phase diagram was the subject of several scientific studies, not just [REDACTED]. *See* Moffa Decl. Ex. 3, Gleason '189 ¶¶ 210-11; Ex. 10 ¶¶ 380-84; *Berman-Simon* (Ex. 52); *Bundy* (Ex. 49); Moffa Decl. Ex. 10, Vagarli

(Carnegie_189_Defendants-00000815-0823); *Strong* 380 (Carnegie_189_Defendants-00000695-706); *Day* (Ex 54); *Kennedy & Kennedy* (Ex. 51); Moffa Decl. Ex. 11, *Strong* 690 (Ex. 50A). A POSA would review the full body of literature, not only [REDACTED] to gain the necessary understanding of the boundary and to assess possible infringement. Ex. 10 ¶¶ 381-82 (presenting “delineation line between graphite and diamond stable phase” based on 6 references); Moffa Decl. Ex.3, Gleason 189 ¶ 211 (“the carbon phase diagram had been published by several researchers. . . A skilled artisan would survey the available literature and make a well-informed determination of the phase boundary and would ascertain within the uncertainty permitted in chemistry whether a particular condition was inside or outside the diamond-stable phase.”).

152. [REDACTED] . Dr. Misra testified as follows:

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

RESPONSE: Plaintiffs object to this proposed fact under Federal Rule of Evidence 802 as hearsay (alleged out of court statements from 2A's [REDACTED] and IIa relies on the statements for its truth, namely, [REDACTED]. Undisputed that IIa has accurately reproduced Dr. Misra's testimony, but Plaintiffs object to the extent the full context for this questioning was not reproduced. For example, IIa cites but does not reproduce a portion of Dr. Misra's testimony indicating that he does not recall if [REDACTED]. Moffa Decl. Ex. 7, Misra Dep. at 244:9-12. To the extent IIa proposes that the cited testimony establishes non-infringement, disputed because Plaintiffs cannot ascertain any facts IIa proposes. Further disputed because of Plaintiffs' extensive evidence establishing infringement. *See* Moffa Decl. Ex. 1, Capano Rep. ¶¶ 365-99.

153. Dr. Hemley testified that when it was published, *Bundy* "present[ed] the entire phase diagram as we currently understand it." Ex. 4 at 166:2-168:2; Ex. 49 at 1. Dr. Hemley stated as follows:

Q. It says, "The plan for this article is to present the entire phase diagram as we currently understand it and then discuss each part giving the salient references and brief descriptions of the work upon which it is based." Do you see that?

A. Yes.

Q. Is that what this article does?

A. Mm-hmm.

* * *

Q. And in the text here on the same page under “The Phase and Reaction Diagram,” it says, “The topology of stability fields of the thermodynamically stable phases is quite simple: (i) the boundary between the graphite and diamond stable regions which runs from 1.7 GPa/0 K, to the graphite/diamond/liquid triple point at about 12GPa/5000K.” Is that referring to this line here?

A. Yes.

Q. Between 5,000 and zero?

A. Yes, yes.

Q. Is that the transition between the diamond and graphite stable regions of the phase diagram?

A. That defines the thermodynamic boundary between graphite and diamond.

Ex. 4 at 167:19-168:24.

RESPONSE: Plaintiffs object to the proposed fact as incomplete and misleading; Dr. Hemley’s complete statement should be considered. *See Fed. R. Evid. 106.* Regarding *Bundy*, PGD’s counsel asked Dr. Hemley: “It says, ‘The plan for this article is to present the entire phase diagram as we currently understand it and then discuss each part giving the salient references and brief descriptions of the work upon which it is based.’ Do you see that?” Ex. 4 167:19-24. Dr. Hemley answered “A. Yes.” *Id.* 167:25. Undisputed but immaterial that IIa has accurately transcribed portions of Dr. Hemley’s testimony. To the extent IIa alleges that [REDACTED] or Dr. Hemley’s testimony support 2A’s alleged non-infringement, disputed because Plaintiffs cannot determine what facts IIa proposes. Further disputed because Dr. Hemley’s testimony did not relate to infringement, the ’189 patent’s scope, or 2A’s process; Dr. Hemley merely acknowledged the phase boundary definition in his 1996 publication. Ex. 4 at 168:3-24. Further disputed

because of Plaintiffs' extensive evidence establishing infringement. *See* Moffa Decl. Ex. 1, Capano Rep. ¶¶ 365-99.

154. [REDACTED]

[REDACTED] Ex. 7 at 242:24-248:2.

RESPONSE: Plaintiffs object to this proposed fact as vague, in particular as to the phrases "authority" and "calibrate." Plaintiffs further object to the proposed fact as calling for information outside of Plaintiffs' possession, custody, or control, and as unsupported by the cited evidence. Subject to Plaintiffs' objections, disputed that [REDACTED] was viewed by a POSA as authoritative regarding the carbon phase diagram. The carbon phase diagram was the subject of several scientific studies, not just [REDACTED]. *See* Moffa Decl. Ex. 3, Gleason '189 ¶¶ 210-11; Ex. 10 ¶¶ 380-84; [REDACTED]
[REDACTED]
[REDACTED]

[REDACTED] A POSA would review the full body of literature, not only [REDACTED] to gain the necessary understanding of the boundary line. Ex. 10 ¶¶ 381-82 (presenting "delineation line between graphite and diamond stable phase" based on 6 references); Gleason 189 ¶ 211 ("the carbon phase diagram had been published by several researchers. . . A skilled artisan would survey the available literature and make a well-informed determination of the phase boundary and would ascertain within the uncertainty permitted in chemistry whether a particular condition was inside or outside the diamond-stable phase.").

155. Dr. Capano admits there is no infringement of the '189 Patent under the [REDACTED] definition. Ex. 10 at ¶¶ 385-86, 392, 398.

RESPONSE: Plaintiffs object to this proposed fact as vague, in particular as to the phrases "admits" and "definition." Disputed because, among other things, [REDACTED]
[REDACTED]

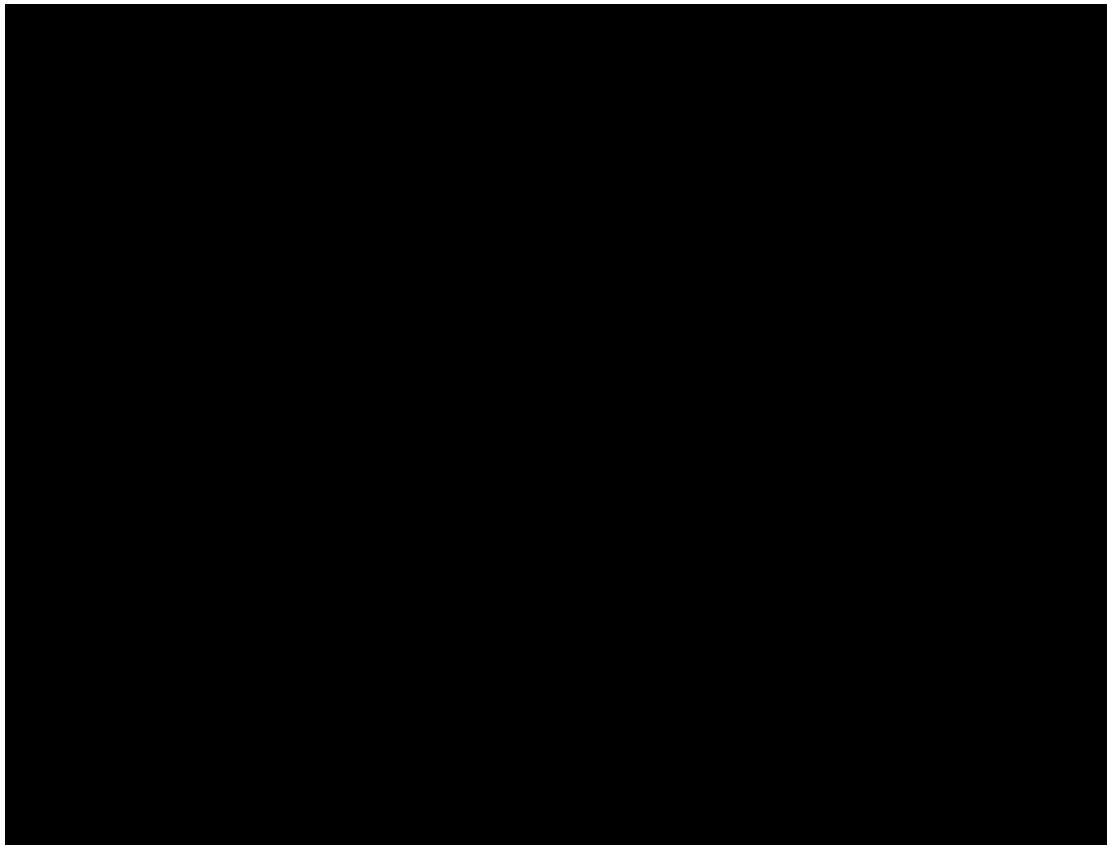
[REDACTED]). Further disputed that [REDACTED] defines the diamond-graphite boundary because that boundary is defined by thermodynamic principles. *See, e.g.*, Ex. 52 at CARN-PGD_00163519 (“Before the enunciation of the Third Law of Thermodynamics there was no means of predicting the equilibrium curve, but from geological evidence it appeared that diamond was formed under conditions of high temperature and high pressure.”). To the extent IIa proposes that [REDACTED] supports 2A’s supposed non-infringement, disputed. The carbon phase diagram was the subject of several scientific studies, not just [REDACTED] *See* Moffa Decl. Ex. 3, Gleason ’189 ¶¶ 210-11; Ex. 10 ¶¶ 380-84; [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] A POSA would review the full body of literature, not only [REDACTED] to gain the necessary understanding of the boundary line and to assess possible infringement, which is what Dr. Capano did to assess IIa and 2A’s infringement. Ex. 10 ¶¶ 381-82 (presenting “delineation line between graphite and diamond stable phase” based on 6 references); Moffa Decl. Ex. 3, Gleason 189 ¶ 211 (“the carbon phase diagram had been published by several researchers. . . A skilled artisan would survey the available literature and make a well-informed determination of the phase boundary and would ascertain within the uncertainty permitted in chemistry whether a particular condition was inside or outside the diamond-stable phase.”).

156. In his deposition in a Singapore litigation, 2AT’s representative, Mr. Vishal Mehta, was asked about the following illustration:



Ex. 55 at ¶ 231.

RESPONSE: Undisputed but immaterial that Vishal Mehta was asked about the figure above in the Singapore Litigation, or that IIa accurately reproduced the figure. Disputed that the cited exhibit (Ex. 55), which is Mr. Mehta's affidavit from the Singapore Litigation, supports the stated fact regarding deposition questioning.

157. The dotted line in the illustration above corresponds to the *Bundy* definition of the diamond-graphite equilibrium line, not the *Berman & Simon* definition. Ex. 57 at ¶ 70.

RESPONSE: Plaintiffs object to this proposed fact as vague, in particular as to the phrase "definition." Disputed. Undisputed that Dr. De Weerdt opined that this figure allegedly employs the "*Bundy* definition, not the *Berman & Simon* definition." Ex. 57 ¶ 70. But disputed because Plaintiffs have no way to assess the accuracy of this statement since neither the figure above nor Ex. 55 support the allegation. Further disputed that *Bundy* or *Berman & Simon* define the diamond-graphite boundary because

that boundary is defined by thermodynamic principles. *See, e.g.*, Ex. 52 at CARN-PGD_00163519 (“Before the enunciation of the Third Law of Thermodynamics there was no means of predicting the equilibrium curve, but from geological evidence it appeared that diamond was formed under conditions of high temperature and high pressure.”).

158. Mr. Mehta testified about the illustration as follows:



Ex. 56 at 44:25-45:7.

RESPONSE: Plaintiffs object to this proposed fact as vague, in particular as to the phrase “illustration.” Undisputed but immaterial that IIa accurately reproduced Mr. Mehta’s deposition testimony from the Singapore Litigation. To the extent IIa is proposing as a fact any of the statements contained in the quoted portion (which is not clear from IIa’s paragraph), disputed on the grounds that Plaintiffs cannot discern what factual proposition(s) IIa is attempting to support.

Dated: October 28, 2020

Respectfully submitted,

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/s/ Matthew J. Moffa

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